

JC03 Rec'd PCT 17 OCT 2005

# 3

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re the application of:

VLADIMIR BALYBERDIN, ET AL.

Docket: RF-33

Serial Number: 10/517,121

Group Art Unit:

**RECEIVED**

Filed: December 2, 2004

Examiner:

18 JAN 2006

For: METHOD AND DEVICE FOR PRODUCING HIGHLY  
ACTIVE RUBBER POWDER FROM RUBBER WASTES

Legal Staff  
International Division

**PETITION UNDER 37 C.F.R. 1.47**  
**AND REQUEST FOR ONE MONTH EXTENSION OF TIME**

Commissioner For Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

Sir:

Petition is hereby made for the grant of Letters Patent under the provisions of 37 CFR 1.47 since the inventors of the above-identified application, namely Vladimir Balyberdin and Roudolf Gorelik either refuse to join in the application for patent, or cannot be found or reached after diligent effort, and they have not signed the required Declaration For Patent Application after request to do so.

**The Last Known Address Of The Non-Signing Co-Inventors**

The last known address of Vladimir Balyberdin is: 1 Kirpitschny-Querstrasse, Haus Nr. 22, Wohnung Nr. 2, Moscow, Russia; and the last known address of Roudolf Gorelik is: Sumskaja-Strasse, Haus Nr. 6, Gebäude 4, Wohnung Nr. 2, Moscow, Russia.

**Proof of Pertinent Facts:**

This application is a U.S. National Phase entry of PCT/EP03/05202, (based on the priority of EP 02012210.7) and published as WO 03/101696A1. This PCT application designed the United States and is effectively a U.S. application filing. The inventors granted a Power of Attorney to Vincent V. Raffay and Thomas Fleck of Raffay & Fleck, Geffckenstrasse 6, D-20249, Hamburg, Germany to represent them for the filing of this PCT application.

Attached as **Exhibit A** are copies of the above Power of Attorney and first page of PCT application publication WO 03/101696A1, corresponding to this application, which indicates the applicant to be Chemplast GmbH and Deutsche Gumtec AG, and designates the inventors to be Vladimir Balyberdin and Roudolf Gorelik.

Attached as **Exhibit B** is a copy of the business formation document for CHEMPLAST GmbH which is signed by both Vladimir Balyberdin and Roudolf Gorelik as principals. The purpose of the formation of the company (see page 3, section 2) is:

- a) The development and sale of equipment and technologies for the treatment of products based on plastics, rubbers and secondary raw materials, as well as the production of these products.
- b) The treatment and scientific research in the field of plastics, rubbers and secondary raw materials.
- c) Trade in goods of all kinds, as well as everything in connection with a standing business, with the exception of activities requiring permission.

Attached as **Exhibit C** is a copy of a patent cooperation contract between Chemplast GmbH and Deutsche Gumtec AG wherein according to paragraphs 2 and 3, the above PCT application will be applied for by both Chemplast GmbH and Deutsche Gumtec AG and the rights for the countries for application will be:

- a) Chemplast GmbH shall has the right of application in the former USSR at the 1/1/1990 borders; and
- b) Deutsche Gumtec AG shall have the rights of application in all other countries.

Therefore U.S. application rights are in solely in Deutsche Gumtec AG. The present U.S. National Phase entry of PCT/EP03/05202 is being presented for filing by the undersigned at the request of Raffay & Fleck on behalf of the assignee Deutsche Gumtec AG.

The undersigned attorney is the representative of Deutsche Gumtec AG, a corporation of Germany, having an office at Ankerstrasse 2, 06108 Halle, Germany, which is the owner of contractual rights in this application and the subject invention, as evidenced by the above documents. The proprietary interest of Deutsche Gumtec AG in this patent application is established in the above-mentioned documents.

**Diligent Efforts to Obtain the Signature of the Inventors**

Further attached hereto as **Exhibits D and E** are copies of correspondences from Prof. Dr. Siegfried Köhli, an authorized officer of Deutsche Gumtec AG, to each of the co-inventors Vladimir Balyberdin and Roudolf Gorelik on November 22, 2004 in which he transmits to them the patent application specification, Declaration for Patent Application, and Assignment and requests them to sign the Declaration for Patent Application and assignment. As of this date no response has been received.

This action is necessary to preserve the rights of Deutsche Gumtec AG and to prevent irreparable damage from the abandonment of the application for failure to respond to the Notice of Missing Requirements under 35 U.S.C. 371 in the United States Designated/Elected Office (DO/EO/US) by the due date. The irreparable damage is that a patent may not be granted on this application.

A copy of the Notice of Missing Requirements under 35 U.S.C. 371 in the United States Designated/Elected Office (DO/EO/US) mailed October 7, 2002 is enclosed.

**The Declaration for Patent Application:**

Enclosed as **Exhibit F** is a Declaration for Patent Application signed by Siegfried Köhli, an authorized officer of Deutsche Gumtec AG as agent for Vladimir Balyberdin and Roudolf Gorelik.

**Petition**

Grant of this Petition and subsequent processing of the application to patent grant is therefore requested.

**Request for Extension of Time to Respond**

The Applicants hereby request the Commissioner to extend the time for response to the Office Action mailed July 13, 2005 from September 13, 2005 to October 13, 2005.

**Fees:**

The following fees are applicable:

Petition Fee under 37 C.F.R. 1.47 and 1.17(g)	\$200.00
Ext. fee for response within 1st month.	<u>\$ 60.00</u>
 TOTAL	 \$260.00

A check in the amount of \$260.00 is enclosed.

The Commissioner is authorized to debit deposit account 18-1589 for any additional fees due in this regard, or credit such account for any overcharge.

I am authorized by the assignee Deutsche Gumtec AG to make this Declaration and

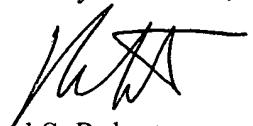
10/20/2005 GFREY1 00000139 10517121

01 FC:1463  
02 FC:2251

200.00 0P  
60.00 0P

Petition on its behalf.

Respectfully submitted,

  
Richard S. Roberts  
Reg. No. 27,941  
P.O. Box 484  
Princeton, New Jersey 08542  
(609) 921-3500  
Date: October 13, 2005

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail, postage pre-paid in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450, on October 13, 2005.

  
Richard S. Roberts  
Reg. No. 27941

## (12) NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT) VERÖFFENTLICHTE INTERNATIONALE ANMELDUNG

(19) Weltorganisation für geistiges Eigentum  
Internationales Büro(43) Internationales Veröffentlichungsdatum  
11. Dezember 2003 (11.12.2003)

PCT

(10) Internationale Veröffentlichungsnummer  
**WO 03/101696 A1**

(51) Internationale Patentklassifikation<sup>7</sup>: B29B 17/00, 13/10, 7/42, C08J 11/06

(21) Internationales Aktenzeichen: PCT/EP03/05202

(22) Internationales Anmeldedatum: 17. Mai 2003 (17.05.2003)

(25) Einreichungssprache: Deutsch

(26) Veröffentlichungssprache: Deutsch

(30) Angaben zur Priorität: 02012210.7 4. Juni 2002 (04.06.2002) EP

(71) Anmelder (für alle Bestimmungsstaaten mit Ausnahme von US): CHEMPLAST GMBH [DE/DE]; Valentinskamp 24, 20354 Hamburg (DE). DEUTSCHE GUMTEC AG [DE/DE]; Ankerstrasse 2, 06108 Halle (DE).

(72) Erfinder; und

(75) Erfinder/Anter (nur für US): BALYBERDIN, Vladimir [RU/RU]; 1 Kirpitschny-Querstrasse, Haus Nr. 22, Wohnung Nr. 2, Moskau (RU). GORELIK, Roudolf [RU/RU]; Sumska-Strasse, Haus Nr. 6, Gebäude 4, Wohnung Nr. 2, Moskau (RU).

(74) Anwälte: RAFFAY, Vincenz, V. usw.; Geffckentrasse 6, 20249 Hamburg (DE).

(81) Bestimmungsstaaten (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

[Fortsetzung auf der nächsten Seite]

(54) Titel: METHOD AND DEVICE FOR PRODUCING HIGHLY ACTIVE RUBBER POWDER FROM RUBBER WASTES

(54) Bezeichnung: VERFAHREN UND EINRICHTUNG ZUR HERSTELLUNG HOCHAKTIVER GUMMIPULVER AUS GUMMIABFÄLLEN



AA... Ausbildung der porigen Struktur in der Anfangsphase der Herabsetzung der Volumenspannung bei der Zerkleinerung von Reifengummi

AA... FORMATION OF THE POROUS STRUCTURE IN THE INITIAL PHASE OF THE REDUCTION IN VOLUME STRAIN WHEN COMMUNTING TIRE RUBBER.

(57) Abstract: The invention relates to a method for producing a highly active rubber powder having a specific geometric area ranging from 0.4 to 5 m<sup>2</sup>/g from scrap tires and from vulcanized wastes of rubber articles based on different types of rubber inside an extrusion-type device having thermomechanical action. The invention is characterized in that the comminution of vulcanized rubbers ensues in two steps: Firstly, the fine comminution of the vulcanized rubbers ensues while forming a porous structure in the particles under the conditions of a volume strain, which ranges from 15 to 250 MPa, increases at a rate ranging from 5 to 90 MPa/s, and which pulsates with an amplitude ranging from ± 5 to 20 MPa and with a frequency ranging from 5 to 600 Hz, and at a temperature, which ranges from 90 to 380 °C and increases at a rate of 50 to 150 °C/s, while simultaneously gas-saturating rubber with decomposition products of plasticizing agents and of other constituents belonging to the rubber composition, and; in the event of a great reduction in the volume strain at a rate ranging from 50 to 150 MPa/s, the porous structure is then destroyed, the specific geometric area of the rubber particles is enlarged, and the particles are cooled.

[Fortsetzung auf der nächsten Seite]

WO 03/101696 A1

## DECLARATION FOR PATENT APPLICATION SOLE OR JOINT

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention titled:

### Method And Device For Producing Highly Active Rubber Powder From Rubber Wastes

the specification of which is filed as U.S. patent application serial number 10/517,121 on December 2, 2004 based on PCT/EP03/05202 having the International Application date May 17, 2003

I HEREBY STATE THAT I HAVE REVIEWED AND UNDERSTAND THE CONTENTS OF THE ABOVE-IDENTIFIED SPECIFICATION, INCLUDING THE CLAIMS.

I ACKNOWLEDGE THE DUTY TO DISCLOSE ALL INFORMATION KNOWN TO ME TO BE MATERIAL TO PATENTABILITY IN ACCORDANCE WITH TITLE 37, CODE OF FEDERAL REGULATIONS, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

**Prior Foreign Application(s)**

(Number)	(Country)	(Day/Month/Year Filed)	Priority Claimed
EP02012210.7	EUROPE	June 4, 2002	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
PCT/EP03/05202	PCT	May 17, 2003	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

I hereby claim the benefit under 35 U.S.C. 119(3) of any United States provisional application(s) listed below:

(Number)	(Country)	(Day/Month/Year Filed)	Priority Claimed
			<input type="checkbox"/> Yes <input type="checkbox"/> No

I hereby claim the benefit under Title 35, United States Code, §120 of any United States applications listed below and, INSOFAR AS THE SUBJECT MATTER OF EACH OF THE CLAIMS OF THIS APPLICATION IS NOT DISCLOSED IN THE PRIOR UNITED STATES APPLICATION IN THE MANNER PROVIDED BY THE FIRST PARAGRAPH OF TITLE 35, UNITED STATES CODE, §112, I ACKNOWLEDGE THE DUTY TO DISCLOSE MATERIAL INFORMATION AS DEFINED IN TITLE 37, CODE OF FEDERAL REGULATIONS, §1.56(a) WHICH OCCURRED BETWEEN THE FILING DATE OF THE PRIOR APPLICATION AND THE NATIONAL OR PCT INTERNATIONAL FILING DATE OF THIS APPLICATION:

(Application Serial Number)	(Filing Date)	(STATUS: Patented, Pending, Abandoned)

**POWER OF ATTORNEY:** As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected herewith (List name and registration number).

**(LIST SENIOR PATENT COUNSEL AND ATTORNEY HANDLING CASE WITH PATENT OFFICE REGISTRATION NUMBERS.)**

Richard S. Roberts	Reg. No. 27, 941	Richard S. Roberts, Jr. Reg. No. 46,024
Marisa A. Roberts	Reg. No. 43,048	

SEND CORRESPONDENCE TO: Richard S. Roberts  
P.O. Box 484  
Princeton, New Jersey 08542-0484

DIRECT TELEPHONE CALLS TO: Richard S. Roberts  
Tel.: (609) 921-3500

## DECLARATION FOR PATENT APPLICATION—SOLE OR JOINT (Continued)

Attorney's Docket No.: RF-33 – Page 2

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

FULL NAME OF SOLE OR FIRST INVENTOR

VLADIMIR BALYBERDIN

Signed as the representative of the inventor Vladimir Balyberdin by Siegfried Köhli, Managing Director of the inventor's contractual assignee, Deutsche Gumtec AG

SIGNATURE OF SIEGFRIED KÖHLI

*S. Köhle*Date 31.08.2005RESIDENCE 1 KIRPITSCHNY-QUERSTRASSE, HAUS NR. 22, WOHNUNG NR. 2, MOSCOW, RUSSIACITIZENSHIP RUSSIAPOST OFFICE ADDRESS 1 KIRPITSCHNY-QUERSTRASSE, HAUS NR. 22, WOHNUNG NR. 2,  
MOSCOW, RUSSIA

FULL NAME OF SECOND JOINT INVENTOR

ROUDOLF GORELIK

Signed as the representative of the inventor Roudolf Gorelik by Siegfried Köhli, Managing Director of the inventor's contractual assignee, Deutsche Gumtec AG

SIGNATURE OF SIEGFRIED KÖHLI

*S. Köhle*Date 31.08.2005RESIDENCE SUMSKAJA-STRASSE, HAUS NR. 6, GEBÄUDE 4, WOHNUNG NR. 2, MOSCOW, RUSSIACITIZENSHIP RUSSIAPOST OFFICE ADDRESS SUMSKAJA-STRASSE, HAUS NR. 6, GEBÄUDE 4, WOHNUNG NR. 2,  
MOSCOW, RUSSIA

FULL NAME OF THIRD JOINT INVENTOR

INVENTOR'S SIGNATURE

Date

RESIDENCE

CITIZENSHIP

POST OFFICE ADDRESS

FULL NAME OF FOURTH JOINT INVENTOR

INVENTOR'S SIGNATURE

Date

RESIDENCE

CITIZENSHIP

POST OFFICE ADDRESS



Deutsche Gumtec AG  
Ankerstraße 2  
06108 Halle  
Tel. 0345/2323551  
Fax 0345/2323601

BEST AVAILABLE COPY

Vertrag über die internationale Zusammenarbeit auf dem Gebiet des Patentwesens  
Bestellung des Anwalts oder gemeinsamen Vertreters

Der (die) unterzeichnete(n) Anmelder bevollmächtigt (bevollmächtigen) hiermit  
Herrn, Frau

RAFFAY & FLECK  
Patentanwälte  
Dipl.-Ing. V. v. Raffay ..... (Name)  
Dipl.-Chem. Dr. Th. Fleck ..... (Name)  
Geffckenstraße 6  
D-20249 Hamburg ..... (Anschrift)

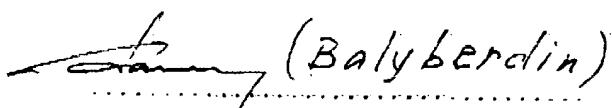
als Anwalt

als gemeinsamen Vertreter

ihn (sie) vor den zuständigen internationalen Behörden in Zusammenhang mit der internationalen Anmeldung  
(Bezeichnung der Erfindung) ..... (Aktenzeichen des (der) Anmelder(s) oder Anwalts, falls  
im Antrag angegeben), ..... (internationales Aktenzeichen, falls bereits vorhanden), eingereicht bei  
..... (Anmeldeamt), zu vertreten und für ihn (sie) Zahlungen entgegenzunehmen.

(Ort) Moskau ..... (Datum) 23.05.2003

(Unterschrift des Anmelders, bei mehreren Anmeldern Unterschriften aller Anmelder)



(Name in Maschinen- oder Blockschrift unter jeder Unterschrift)

## Vertrag über die internationale Zusammenarbeit auf dem Gebiet des Patentwesens

Bestellung des Anwalts oder gemeinsamen Vertreters

Der (die) unterzeichnete(n) Anmelder bevollmächtigt (bevollmächtigen) hiermit  
Herrn, Frau

RAFFAY &amp; FLECK

Patentanwälte

Dipl.-Ing. V. v. Raffay ..... (Name)

Dipl.-Chem. Dr. Th. Fleck ..... (Name)

Geffckenstraße 6

D-20249 Hamburg ..... (Anschrift)

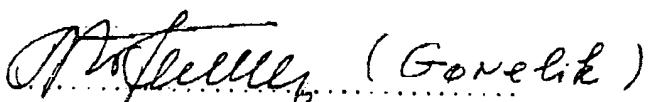
 als Anwalt als gemeinsamen Vertreter

ihm (sie) vor den zuständigen internationalen Behörden in Zusammenhang mit der internationalen Anmeldung  
..... (Bezeichnung der Erfindung) ..... (Aktenzeichen des (der) Anmelder(s) oder Anwalt(s), falls  
im Antrag angegeben), ..... (internationales Aktenzeichen, falls bereits vorhanden), cingereicht bei  
..... (Anmeldeamt), zu vertreten und für ihn (sic) Zahlungen entgegenzunehmen.

(Ort) Moskau

(Datum) 23.05.2003

(Unterschrift des Anmelders, bei mehreren Anmeldern Unterschriften aller Anmelder)



(Name in Maschinen- oder Blockschrift unter jeder Unterschrift)

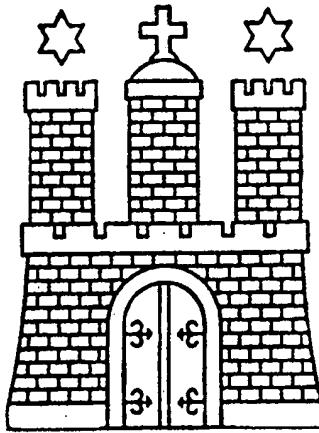
Dr. BERNHARD v. SCHWEIN  
Dr. DETLEF THOMSEN  
Dr. JÜRGEN BREDTHAUER  
Dr. ANDRE VOLLBRECHT  
Dr. MICHAEL COMMICHAU  
Dr. MARTIN MULERT, LL.M.

Urkundenrolle Nr. 1337/2002  
ms

EXHIBIT B

NOTARE

Gänsemarkt 50 · 20354 Hamburg  
Postfach 301280 · 20305 Hamburg  
Telefon: (040) 35 55 30  
Teletax: (040) 35 55 33 00



## BEGLAUBIGTE ABSCHRIFT

Verhandelt in dieser Freien und Hansestadt Hamburg

am 26. (sechsundzwanzigsten) März 2002 (zweitausendzwei).

Vor mir,

dem Hamburgischen Notar

Dr. Detlef Thomsen

erschienen heute in meinen Amtsräumen, Gänsemarkt 50:

Herr Alexandre Borovski,  
geb. am 20. September 1958,  
wohhaft: ul. 2. Nowoostankinskaja 27-45, Moskau,  
ausgewiesen durch Reisepaß der UdSSR Nr. 44 No. 5301257,

dieser handelnd für sich persönlich sowie für

a) Herrn Vladimir Nikolajewitsch Balyberdin,  
geb. am 30. November 1947  
wohhaft: 1 Kirpitschny-Querstraße, Haus Nr. 22, Stadt Moskau,

aufgrund Vollmacht vom 07. Februar 2002 (registriert im Register unter Nr. 2-455 des Notars G.G. Tscheremnych, Moskau), die bei Beurkundung im Original vorgelegen hat und diesem Protokoll in Abschrift beigefügt ist,

b) Herrn Dmitri Rämowitsch Orlovski,  
geb. am 26. Oktober 1961,  
wohhaft: Nowaja-Strasse, Haus Nr. 12, Wohnung Nr. 35, Moskau / Ljuberzy,

aufgrund Vollmacht vom 07. Februar 2002 (registriert im Register unter Nr. 2-454 des Notars G.G. Tscheremnych, Moskau), die bei Beurkundung im Original vorgelegen hat und diesem Protokoll in Abschrift beigefügt ist,

c) Herrn Roudolf Abramowitsch Gorelik,  
geb. am 14. Januar 1941,  
wohhaft: Sumskaja-Strasse, Haus Nr. 6, Gebäude 4, Whg. Nr. 2, Moskau,

aufgrund Vollmacht vom 07. Februar 2002 (registriert im Register unter Nr. 2-456 des Notars G.G. Tscheremnych, Moskau), die bei Beurkundung im Original vorgelegen hat und diesem Protokoll in Abschrift beigefügt ist.

Der Erschienene ist nach seinen Angaben und nach der Überzeugung des Notars der deutschen Sprache sehr gut kundig. Nach Belehrung durch den Notar verzichtete der Erschienene auf die Hinzuziehung eines Dolmetschers und die Anfertigung und Beifügung einer schriftlichen Übersetzung.

Der Erschienene erklärte zu meinem Protokoll:

I.

Wir errichten hiermit eine Gesellschaft mit beschränkter Haftung und legen den Gesellschaftsvertrag wie folgt fest:

§ 1

Firma, Sitz

(1) Die Firma der Gesellschaft lautet:

Chemplast GmbH.

(2) Die Gesellschaft hat ihren Sitz in Hamburg.

§ 2

Gegenstand des Unternehmens

(1) Der Gegenstand des Unternehmens ist

- a) die Entwicklung und der Verkauf von Ausrüstungen und Technologien für die Bearbeitung von Produkten auf Basis von Kunststoffen, Gummi- und Sekundärrohstoffen sowie die Produktion dieser Produkte;
- b) die Bearbeitung und wissenschaftliche Forschung auf dem Gebiet der Kunststoffe, Gummi und Sekundärrohstoffe,
- c) der Handel mit Waren aller Art sowie alle damit im Zusammenhang stehenden Geschäfte, mit Ausnahme erlaubnispflichtiger Tätigkeiten.

(2) Die Gesellschaft kann sich an anderen Unternehmen beteiligen, andere Unternehmen erwerben und Zweigniederlassungen im In- und Ausland errichten.

§ 3

Stammkapital, Stammeinlagen

(1) Das Stammkapital beträgt EUR 25.000,00  
(in Worten: EURO fünfundzwanzigtausend).

(2) Hierauf übernehmen als Gründungsgesellschafter

a) Alexandre Borovski, geb. am 20. September 1958 eine Stammeinlage in Höhe von	€ 6.250,00
b) <u>Vladimir Nikolajewitsch Balyberdin</u> , geb. am 30. November 1947, eine Stammeinlage in Höhe von	€ 6.250,00

c) Dmitri Rämowitsch Orlovski,  
geb. am 26. Oktober 1961,  
eine Stammeinlage in Höhe von € 6.250,00

c) Roudolf Abramowitsch Gorelik,  
geb. am 14. Januar 1941,  
eine Stammeinlage in Höhe von € 6.250,00.

(3) Die Einlagen sind jeweils in bar zu leisten und sofort zur Hälfte fällig.

#### § 4

##### Dauer, Geschäftsjahr

(1) Die Dauer der Gesellschaft ist unbestimmt.  
(2) Das Geschäftsjahr ist das Kalenderjahr.

#### § 5

##### Geschäftsführung

(1) Die Gesellschaft hat einen oder mehrere Geschäftsführer. Hat die Gesellschaft nur einen Geschäftsführer, so ist dieser alleinvertretungsberechtigt. Bei mehreren Geschäftsführern sind je zwei von ihnen oder ein Geschäftsführer gemeinsam mit einem Prokuristen zur Vertretung der Gesellschaft berechtigt. Die Gesellschafter können jedoch durch Beschuß Alleinvertretungsbefugnis verleihen.  
(2) Geschäftsführer können durch Gesellschafterbeschuß von den Beschränkungen des § 181 BGB befreit werden. Der alleinige Geschäftsführer ist von den Beschränkungen des § 181 BGB befreit.  
(3) Die vorstehenden Absätze (1) und (2) gelten entsprechend für jeden Liquidator.

#### § 6

##### Gesellschafterversammlung

(1) Die Gesellschafterversammlungen finden grundsätzlich am Sitz der Gesellschaft statt.  
(2) Die Gesellschafter fassen ihre Beschlüsse grundsätzlich in Gesellschafterversammlungen. Sie können aber auch schriftlich, fernschriftlich oder auf sonstige Art gefaßt werden, wenn alle Gesellschafter mit dem Verfahren einverstanden sind.  
(3) Gefaßte Beschlüsse sind von der Geschäftsführung zu protokollieren und den Gesellschaftern zu übersenden. Sie können nur innerhalb eines Monats ab Zugang des Protokolls durch Klage angefochten werden.

(4) Je EUR 50,00 des Nennbetrages eines Geschäftsanteils gewähren eine Stimme.

§ 7

Jahresabschluß, Gewinnverwendung

(1) Der Jahresabschluß ist von der Geschäftsführung innerhalb der gesetzlichen Frist nach Ablauf eines Geschäftsjahres aufzustellen und unverzüglich den Gesellschaftern zur Feststellung vorzulegen.  
Die Gesellschafter haben den Jahresabschluß innerhalb der gesetzlichen Frist festzustellen und über die Ergebnisverwendung zu beschließen.

(2) Die Gesellschafter haben Anspruch auf Gewinnausschüttung, es sei denn, die Gesellschafterversammlung beschließt mit einfacher Mehrheit der abgegebenen Stimmen die Bildung von Rücklagen und/oder Gewinnvorträgen.

§ 8

Abtretung von Geschäftsanteilen

(1) Die Abtretung von Geschäftsanteilen und Teilgeschäftsanteilen sowie jede sonstige Verfügung hierüber bedarf – mit Ausnahme von Verfügungen zugunsten von Mitgesell-schaftern – zu ihrer Wirksamkeit der Zustimmung der Gesellschaft. Diese darf im Innenverhältnis nur erteilt werden, wenn ein entsprechender einstimmig gefaßter Gesellschafterbeschluß vorliegt.

(2) Die Bestimmungen des § 17 GmbH-Gesetz bleiben unberührt.

§ 9

Befreiung vom Wettbewerbsverbot

Den Gesellschaftern und den Geschäftsführern sind Nebentätigkeiten und Nebengeschäfte grundsätzlich gestattet. Soweit solche Geschäfte den Geschäftsbereich der Gesellschaft berühren können, entscheidet die Gesellschafterversammlung über die Befreiung vom Wettbewerbsverbot und legt dessen Art und Umfang sowie das etwaige Entgelt fest.

§ 10

Zusammenlegung von Geschäftsanteilen

Mehrere voll eingezahlte Geschäftsanteile desselben Gesellschafters können mit Zustimmung des betroffenen Gesellschafters durch Gesellschafterbeschluß zu einem Geschäftsanteil zusammengelegt werden.

§ 11

Einziehung von Geschäftsanteilen

Der Geschäftsanteil eines Gesellschafters kann durch einstimmigen Gesellschafterbeschuß, bei dem der betroffene Gesellschafter kein Stimmrecht hat, eingezogen werden, wenn der betroffene Gesellschafter zustimmt oder ein wichtiger Grund entsprechend § 133 HGB vorliegt. Dem betroffenen Gesellschafter steht ein Einziehungsentgelt in Höhe des Verkehrswertes des Geschäftsanteils zu.

§ 12

Bekanntmachungen

Die Veröffentlichungen der Gesellschaft erfolgen nur im Bundesanzeiger.

§ 13

Kosten und Abgaben

Die Kosten und Abgaben der Gründung trägt die Gesellschaft bis zu einem Betrag von EUR 2.500,00; etwa darüber hinausgehende Gründungskosten tragen die Gesellschafter im Verhältnis ihrer Einlagen.

II.

Gesellschafterbeschuß

Als Gründer und erste Gesellschafter halten wir nunmehr eine Gesellschafterversammlung ab und beschließen folgendes:

1. Zum ersten Geschäftsführer der Gesellschaft wird bestellt:  
Alexandre Borovski,  
geb. am 20. September 1958.

Herr Alexandre Borovski ist einzelvertretungsberechtigt und von den Beschränkungen des § 181 BGB befreit.

2. Die Geschäftsräume der Gesellschaft befinden sich Gänsemarkt 50, 20354 Hamburg.

III.

Vollmacht

Wir bevollmächtigen hiermit

Herrn Peter Ramin,  
Herrn Dieter Rüppcke,  
Herrn Wolfgang Nickel,  
Herrn André Eising,  
Herrn Martin Lafrenz,

sämtlich Bürovorsteher, Gänsemarkt 50, 20354 Hamburg,

und zwar einen jeden für sich allein, unter Befreiung von den Beschränkungen des § 181 BGB, die in dem vorstehenden Gesellschaftsvertrag vereinbarten Bestimmungen sowohl materiell als auch formell für sämtliche Gesellschafter zu ändern und zu ergänzen, entsprechende Abänderungsbeschlüsse einseitig zu fassen und zur Anmeldung zu bringen.

Die Vollmacht ist im Außenverhältnis unbeschränkt. Im Innenverhältnis werden die Bevollmächtigten angewiesen, von dieser Vollmacht nur Gebrauch zu machen, wenn die Geschäftsführung der Gesellschaft einer Änderung oder Ergänzung zugestimmt hat.

Die Vollmacht wird unabhängig von der Wirksamkeit dieser Urkunde erteilt. Sie erlischt mit Eintragung der Gesellschaft im Handelsregister.

IV.

Hinweise

Der Notar hat darauf hingewiesen, daß

- a) die Gesellschaft mit beschränkter Haftung als solche erst mit der Eintragung in das Handelsregister entsteht und die vor Eintragung in ihrem Namen Handelnden persönlich haften,
- b) jeder Gesellschafter für Fehlbeträge haftet, wenn der Wert des Gesellschaftsvermögens bei Eintragung der Gesellschaft in das Handelsregister niedriger ist als das Stammkapital,
- c) die Gesellschafter und Geschäftsführer bei falschen Angaben oder Schädigung der Gesellschaft durch Einlagen oder Gründungsaufwand u. U. ersetzt- und strafrechtlich verantwortlich sind,
- d) kapitalersetzende Gesellschafterdarlehen u. U. wie haftendes Kapital behandelt werden,
- e) Bareinlageverpflichtungen nicht durch verdeckte Sacheinlagen (z.B. Verrechnungen oder Vorausleistungen) erfüllt werden können,

- f) bezüglich der Stammeinlagen sowie für Kosten und Abgaben eine gesamtschuldnerische Haftung besteht,
- g) eine Vereinigung aller Geschäftsanteile in der Hand eines Gesellschafters oder daneben in der Hand der Gesellschaft dem Handelsregister unverzüglich anzugeben ist, wenn die Vereinigung innerhalb von 3 Jahren nach der Eintragung der Gesellschaft in das Handelsregister erfolgt und in diesem Fall für noch ausstehende Einlagen u.U. Sicherheit zu leisten ist,
- h) es allein Sache der Beteiligten ist, die steuerlichen Folgen dieses Vertrages zu überprüfen und der Notar insoweit keine Gewähr übernimmt.

Vorgelesen, genehmigt und unterschrieben:

gez. Borovski,  
L.S. not. gez. Dr. Thomsen, Notar

## ДОВЕРЕННОСТЬ на основание ГМБХ

Я, гражданин Российской Федерации Балыбердин Владимир Николаевич 30.11.47 года рождения, паспорт XV-МЮ №649552, выданный 62 о/м г. Москвы 11.10.78 г., зарегистрированный по месту жительства по адресу: г. Москва, 1 Кирпичный пер., д.22, кв.2

предоставляю

Боровскому Александру Иосифовичу, проживающему по адресу: г. Москва, ул. 2-ая Новоостанкинская, д.27, кв.45,  
следующие полномочия:

Представлять меня при основании товарищества с ограниченной ответственностью (ГМБХ) в соответствии с немецким правом с названием фирмы Хемпласт Гамбург с месторасположением: г. Гамбург и с уставным капиталом в 25.000 (Двадцать пять тысяч) Евро.

Представлять меня при заключении контракта о товариществе, определять во всех деталях текст Устава товарищества, подписаться за меня за мой уставной взнос в размере 6250 (шесть тысяч двести пятьдесят) Евро, и взять на себя обязательство его выплатить. Участвовать в назначении и отзыве исполнительного директора, заявить о частном предприятии, заявить о занесении товарищества в Торговый Регистр, а также дать все сведения, необходимые для занесения товарищества в Торговый Регистр, получить документы о занесении товарищества в Торговый Регистр.

Предметом деятельности товарищества должны быть наука, консалтинг, производство и торговля.

Кроме того, мой уполномоченный имеет право представлять меня на всех последующих собраниях участников товарищества с правом голоса, имеет право изменить ранее выданные сведения или полностью их отменить.

Уполномоченный освобожден от ограничений, §181 BGB.

Балыбердин Владимир Николаевич

От имени Российской Федерации:

г. Москва. Седьмого февраля две тысячи второго года.

Я, Черемных Геннадий Григорьевич, нотариус г. Москвы удостоверяю, что приведенная выше доверенность совершена лично явившимся ко мне г-ном Балыбердиным Владимиром Николаевичем, проживающим в г. Москва, 1 Кирпичный пер., д.22, кв.2, который известен мне, как лицо, указанное в доверенности, собственноручно подписавший ее в моем присутствии, должностным образом подтвердившее мне, что он оформил настоящую доверенность.

Зарегистрировано в реестре за № 2-455  
Взыскан тариф 200 руб. 00 коп.

Нотариус

Г. Г. Черемных



## GmbH-Gründungsvollmacht

Ich, Bürger der Russischen Föderation Balyberdin Vladimir Nikolajewitsch, Geburtsdatum: den 30.11.47, Paß XV-MIO Nr. 649552, ausgestellt am 11.10.78 von der Milizabteilung Nr. 62 der Stadt Moskau, wohnhaft per Adresse: Stadt Moskau, 1 Kupitschny-Querstrasse, Haus Nr. 22, Wohnung Nr. 2,  
erteile hierdurch

Borovski Alexandr Iosifowitsch, wohnhaft in: Stadt Moskau, 2-aja Novoostankinskaja-Str., Haus Nr. 27, Wohnung 45,

folgende Auftrag und Vollmacht,

mich bei der Gründung einer Gesellschaft mit beschränkter Haftung (GmbH) nach deutschem Recht unter dem Namen der Firma: Chemplast Hamburg mit dem Sitz: Stadt Hamburg und mit einem Stammkapital von 25.000 (fünfundzwanzigtausend) Euro, zu vertreten, d.h. mich bei dem Abschluß des Gesellschaftsvertrages zu vertreten, den Satzungswortlaut in allen Einzelheiten festzustellen, für mich eine Stammeinlage von 6250 (sechstausend zweihundertundfünfzig) Euro zu zeichnen und mich zur Einzahlung zu verpflichten, Geschäftsführer zu bestellen und anzurufen, den Gewerbebetrieb anzumelden, die Gesellschaft zur Eintragung in das Handelsregister anzumelden und alle weiteren zur Eintragung der Gesellschaft in das Handelsregister erforderlichen und üblichen Erklärungen abzugeben und entgegenzunehmen.

Als Gegenstand der Gesellschaft sollen Wissenschaft, Consulting, Produktion und Handel sein.

Ferner ist der Bevollmächtigte befugt, mich bei allen späteren Gesellschafterversammlungen zu vertreten und für mich das Stimmrecht auszuüben, einmal abgegebene Erklärungen zu ändern oder gänzlich wieder aufzuheben.

Der Bevollmächtigte ist von den Beschränkungen des § 181 BGB befreit.

Balyberdin Vladimir Nikolajewitsch Unterschrift

Im Namen der Russischen Föderation:

Stadt Moskau. Den siebten Februar zweitausendundzwei.

Ich, Tscheremnych Gennadij Grigorjewitsch, Notar der Stadt Moskau, bestätige, daß die obenangeführte Vollmacht von vor mir persönlich erschienenen Herrn Balyberdin Vladimir Nikolajewitsch geleistet wurde, wohnhaft per Adresse: Stadt Moskau, 1 Kupitschny-Querstrasse, Haus Nr. 22, Wohnung Nr. 2, der mir als Person, die in vorliegender Vollmacht erwähnt wurde, bekannt ist, die sie in meiner Anwesenheit eigenhändig unterzeichnet und sachgemäß die Ausfertigung dieser Vollmacht bestätigt hat.

Registriert im Register unter Nr. 2-455

Entrichtet gemäß dem Tarif 200 Rub. 00 Kop.

Notar Unterschrift G.G. Tscheremnych

Wappensiegel des Notars der Stadt Moskau Tscheremnych G.G.

Diese Übersetzung aus dem Russischen ins Deutsche wurde von mir, Daurowa Lena Nikolajewna, ausgeführt, ich bestätige die Identität der Übersetzung.

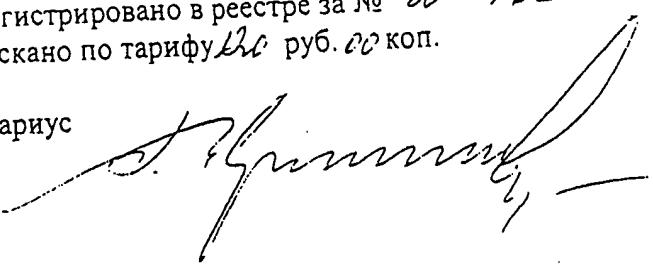
Данный перевод с русского языка на немецкий выполнен мной, Дауровой Леной Николаевной, идентичность перевода подтверждаю.

-3-

Город Москва. Седьмого февраля две тысячи второго года я, ЧЕРЕМНЫХ  
АНАЛИИ ГРИГОРЬЕВИЧ, нотариус г. Москвы, свидетельствую подлинность  
данной сделанной известным мне переводчиком, гр. ДАУРОВОЙ ЛЕНОЙ НИ-  
ЧАЕВНОЙ

Зарегистрировано в реестре за № 2-465  
Взыскано по тарифу 110 руб. 00 коп.

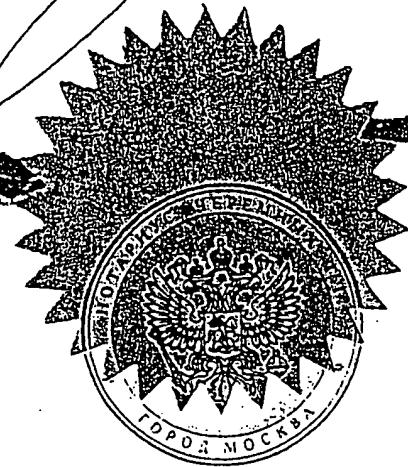
Нотариус



Всего прошнуровано, пронумеровано  
и скреплено печатью три листа.

Нотариус

*С. Григорьев*



APOSTILLE \* АПОСТИЛ  
(CONVENTION DE LA HAYE DU 5 OCTOBRE 1961-  
ГААГСКАЯ КОНВЕНЦИЯ ОТ 5 ОКТЯБРЯ 1961г.)

1. РОССИЙСКАЯ ФЕДЕРАЦИЯ *Григорьев*  
Настоящий официальный документ
2. Подпись *Григорьев С.Г.*  
(фамилия)
3. Выступающим в качестве нотариуса  
(должность)

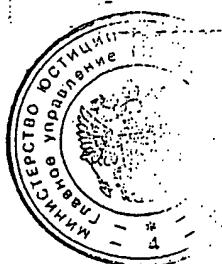
4. Скреплен печатью нотариуса г. Москвы

УДОСТОВЕРЕНО

5. В городе Москве 6. 18.02.2001  
(дата диграммы)

7. *Григорьев С.Г.* Зам начальника  
(фамилия, должность лица)  
Главного управления Министерства юстиции  
народного просвещения и науки  
Российской Федерации по г. Москве

8. За № 1393



*Григорьев*

## ДОВЕРЕННОСТЬ на основание ГМБХ

Я, гражданин Российской Федерации Орловский Дмитрий Рэмович 26.10.61 года рождения, паспорт IV-КБ №733019, выданный ОВД Советского РИК г. Казани 12.04.78 г., зарегистрированный по месту жительства по адресу: Московская обл, б. г. Люберцы, ул. Новая, д.12, кв.35.,

предоставляю

Боровскому Александру Иосифовичу, проживающему по адресу: г. Москва, ул. 2-ая Новоостанкинская, д.27, кв.45,  
следующие полномочия:

Представлять меня при основании товарищества с ограниченной ответственностью (ГМБХ) в соответствии с немецким правом с названием фирмы Хемпласт Гамбург с месторасположением: г. Гамбург и с уставным капиталом в 25.000 (Двадцать пять тысяч) Евро.

Представлять меня при заключении контракта о товариществе, определять во всех деталях текст Устава товарищества, подписьаться за меня за мой уставной взнос в размере 6250 (шесть тысяч двести пятьдесят) Евро, и взять обязательство его выплатить. Участвовать в назначении и отзыве исполнительного директора, заявить о частном предприятии, заявить о занесении товарищества в Торговый Регистр, а также дать все сведения, необходимые для занесения товарищества в Торговый Регистр, получить документы о занесении товарищества в Торговый Регистр.

Предметом деятельности товарищества должны быть наука, консалтинг, производство и торговля.

Кроме того, мой уполномоченный имеет право представлять меня на всех последующих собраниях участников товарищества с правом голоса, имеет право изменить ранее выданные сведения или полностью их отменить.

Уполномоченный освобожден от ограничений, §181 BGB.

Орловский Дмитрий Рэмович ДО

От имени Российской Федерации:

г. Москва. Седьмого февраля две тысячи второго года.

Я, Черемных Геннадий Григорьевич, нотариус г. Москвы удостоверяю, что приведенная выше доверенность совершена лично явившимся ко мне г-ном Орловским Дмитрием Рэмовичем, проживающим в Московской обл, г. Люберцы, ул. Новая, д.12, кв.35, который известен мне, как лицо, указанное в доверенности, собственноручно подписавший ее в моем присутствии, должностным образом подтвердившее мне, что он оформил настоящую доверенность.

Зарегистрировано в реестре за № 2-454  
Взыскан тариф 200 руб. 00 коп.

Нотариус

Г. Г. Черемных



## GmbH-Gründungsvollmacht

Ich, Bürger der Russischen Föderation Orlovski Dmitri Rämovitsch, Geburtsdatum: den 26.10.61, Paß IV-KB Nr. 733019, ausgestellt am 12.04.78 von der Abteilung für innere Angelegenheiten des Bezirksexekutivkomitees Sowjetski der Stadt Moskau, wohnhaft per Adresse: Gebiet Moskau, Stadt Ljuberzy, Nowaja-Strasse, Haus Nr. 12, Wohnung Nr. 35,  
erteile hierdurch

Borovski Alexandre Iosifowitsch, wohnhaft in: Stadt Moskau, 2-aja Novoostankinskaja-Str., Haus Nr. 27, Wohnung 45,

folgende Auftrag und Vollmacht,

mich bei der Gründung einer Gesellschaft mit beschränkter Haftung (GmbH) nach deutschem Recht unter dem Namen der Firma: Chemplast Hamburg mit dem Sitz: Stadt Hamburg und mit einem Stammkapital von 25.000 (fünfundzwanzigtausend) Euro, zu vertreten, d.h. mich bei dem Abschluß des Gesellschaftsvertrages zu vertreten, den Satzungswortlaut in allen Einzelheiten festzustellen, für mich eine Stammeinlage von 6250 (sechstausend zweihundertundfünfzig) Euro zu zeichnen und mich zur Einzahlung zu verpflichten, Geschäftsführer zu bestellen und anzurufen, den Gewerbebetrieb anzumelden, die Gesellschaft zur Eintragung in das Handelsregister anzumelden und alle weiteren zur Eintragung der Gesellschaft in das Handelsregister erforderlichen und üblichen Erklärungen abzugeben und entgegenzunehmen.

Als Gegenstand der Gesellschaft sollen Wissenschaft, Consulting, Produktion und Handel sein.

Ferner ist der Bevollmächtigte befugt, mich bei allen späteren Gesellschafterversammlungen zu vertreten und für mich das Stimmrecht auszuüben, einmal abgegebene Erklärungen zu ändern oder gänzlich wieder aufzuheben.

Der Bevollmächtigte ist von den Beschränkungen des § 181 BGB befreit.

Orlovski Dmitri Rämovitsch

Unterschrift

Im Namen der Russischen Föderation:

Stadt Moskau. Den siebenten Februar zweitausendundzwei.

Ich, Tscheremnych Gennadij Grigorjewitsch, Notar der Stadt Moskau, bestätige, daß die obenangeführte Vollmacht von vor mir persönlich erschienenen Herrn Orlovski Dmitri Rämovitsch geleistet wurde, wohnhaft per Adresse: Gebiet Moskau, Stadt Ljuberzy, Nowaja-Strasse, Haus Nr. 12, Wohnung Nr. 35, der mir als Person, die in vorliegender Vollmacht erwähnt wurde, bekannt ist, die sie in meiner Anwesenheit eigenhändig unterzeichnet und sachgemäß die Ausfertigung dieser Vollmacht bestätigt hat.

Registriert im Register unter Nr. 2-454

Entrichtet gemäß dem Tarif 200 Rub. 00 Kop.

Notar Unterschrift G.G. Tscheremnych

Wappensiegel des Notars der Stadt Moskau Tscheremnych G.G.

Diese Übersetzung aus dem Russischen ins Deutsche wurde von mir, Daurowa Lena Nikolajewna, ausgeführt, ich bestätige die Identität der Übersetzung.

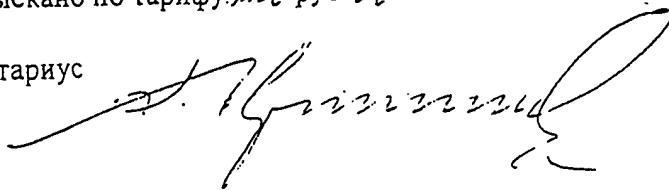
Данный перевод с русского языка на немецкий выполнен мной, Дауровой Леной Николаевной, идентичность перевода подтверждаю.



Город Москва. Седьмого февраля двадцати тысяч второго года я, ЧЕРЕМНЫХ  
АЛЕКСАНДРИЙ ГРИГОРЬЕВИЧ, нотариус г. Москвы, свидетельствую подлинность  
переводчиком, сделанной известным мне переводчиком, гр. ДАУРОВОЙ ЛЕНОЙ НИ-  
КОЛАЕВНОЙ.

Зарегистрировано в реестре за № 2-464  
Взыскано по тарифу 110 руб. 00 коп.

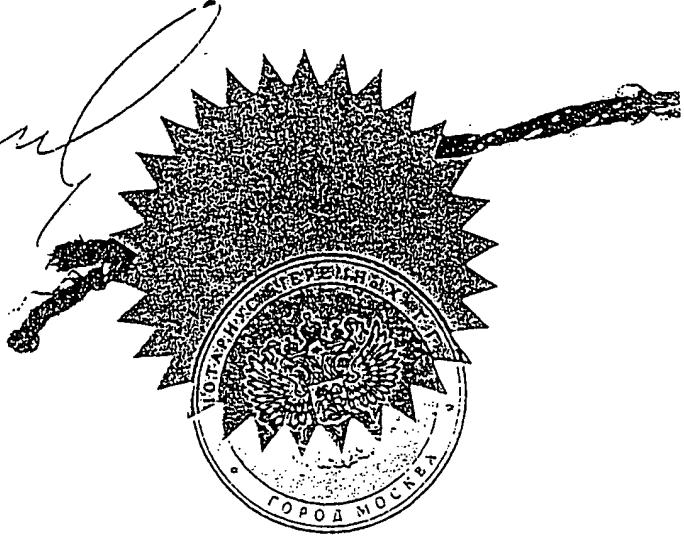
Нотариус



Всего прошнуровано, пронумеровано  
и скреплено печатью три листа.

Нотариус

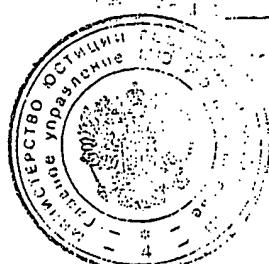
*Григорий*



APOSTILLE * АПОСТИЛ	
(CONVENTION DE LA HAYE DU 5 OCTOBRE 1861)	
ГААГСКАЯ КОНВЕНЦИЯ ОТ 5 ОКТЯБРЯ 1861г.)	
1.	РОССИЙСКАЯ ФЕДЕРАЦИЯ <i>Григорий Григорьевич</i> Настоящий официальный документ
2.	Подписан <i>Григорий Г. Г.</i> (Фамилия)
3.	Выступающим в качестве <i>нотариус</i> (Должность)
4.	Скреплен печатью нотариуса г. Москвы
УДОСТОВЕРЕНО	
5.	В городе Москве 6. <i>11.01.2003</i> (дата удостоверения)
7.	<i>Григорий Григорьевич</i> (Фамилия, имя, отчество)
Главного управления по работе с иностранными гражданами и лицами без гражданства	
на территории г. Москвы	

*139d*

*А.Д.Григорьев*



## ДОВЕРЕННОСТЬ на основание ГМБХ

Я, гражданин Российской Федерации Горелик Рудольф Абрамович 14.01.41 года рождения, паспорт XVI-МЮ №535954, выданный 130 о/м г. Москвы 25.11.78 г., зарегистрированный по месту жительства по адресу: г. Москва, ул. Сумская, д.6, корп.4, кв.2,

предоставляю

Боровскому Александру Иосифовичу, проживающему по адресу: г. Москва, ул. 2-ая Новоостанкинская, д.27, кв.45,

следующие полномочия:

Представлять меня при основании товарищества с ограниченной ответственностью (ГМБХ) в соответствии с немецким правом с названием фирмы Хемпласт Гамбург с месторасположением: г. Гамбург и с уставным капиталом в 25.000 (Двадцать пять тысяч) Евро.

Представлять меня при заключении контракта о товариществе, определять во всех деталях текст Устава товарищества, подписьаться за меня за мой уставной взнос в размере 6250 (шесть тысяч двести пятьдесят) Евро, и взять обязательство его выплатить. Участвовать в назначении и отзыве исполнительного директора, заявить о частном предприятии, заявить о занесении товарищества в Торговый Регистр, а также дать все сведения, необходимые для занесения товарищества в Торговый Регистр, получить документы о занесении товарищества в Торговый Регистр.

Предметом деятельности товарищества должны быть наука, консалтинг, производство и торговля.

Кроме того, мой уполномоченный имеет право представлять меня на всех последующих собраниях участников товарищества с правом голоса, имеет право изменить ранее выданные сведения или полностью их отменить.

Уполномоченный освобожден от ограничений, §181 BGB.

Горелик Рудольф Абрамович М.Г.

От имени Российской Федерации:

г. Москва. Седьмого февраля две тысячи второго года.

Я, Черемных Геннадий Григорьевич, нотариус г. Москвы удостоверяю, что приведенная выше доверенность совершена лично явившимся ко мне г-ном Гореликом Рудольфом Абрамовичем, проживающим в г. Москве, ул Сумская, д.6, корп.4, кв.2, который известен мне, как лицо, указанное в доверенности, собственноручно подписавший ее в моем присутствии, должным образом подтвердившее мне, что он оформил настоящую доверенность.

Зарегистрировано в реестре за № 2-456  
Взыскан тариф 200 руб. 00 коп.



Нотариус

Г. Г. Черемных

-2-

Übersetzung aus dem Russischen ins Deutsche

## GmbH-Gründungsvollmacht

Ich, Bürger der Russischen Föderation Gorelik Roudolf Abramowitsch, Geburtsdatum den 14.01.41, Paß XVI-MIO Nr. 535954, ausgestellt am 25.11.78 von der Millizabteilung Nr. 130 der Stadt Moskau, wohnhaft per Adresse: Stadt Moskau, Sumskaja-Strasse, Haus Nr. 6, Gebäude 4, Wohnung Nr. 2,  
erteile hierdurch

Borovski Alexandr Iosifowitsch, wohnhaft in: Stadt Moskau, 2-aja Novoostankinskaja-Str., Haus Nr. 27, Wohnung 45,

folgende Auftrag und Vollmacht,

mich bei der Gründung einer Gesellschaft mit beschränkter Haftung (GmbH) nach deutschem Recht unter dem Namen der Firma: Chemplast Hamburg mit dem Sitz: Stadt Hamburg und mit einem Stammkapital von 25.000 (fünfundzwanzigtausend) Euro, zu vertreten, d.h. mich bei dem Abschluß des Gesellschaftsvertrages zu vertreten, den Satzungswortlaut in allen Einzelheiten festzustellen, für mich eine Stammeinlage von 6250 (sechstausend zweihundertundfünfzig) Euro zu zeichnen und mich zur Einzahlung zu verpflichten, Geschäftsführer zu bestellen und anzurufen, den Gewerbebetrieb anzumelden, die Gesellschaft zur Eintragung in das Handelsregister anzumelden und alle weiteren zur Eintragung der Gesellschaft in das Handelsregister erforderlichen und gleichen Erklärungen abzugeben und entgegenzunehmen.

Als Gegenstand der Gesellschaft sollen Wissenschaft, Consulting, Produktion und Handel sein.

Ferner ist der Bevollmächtigte befugt, mich bei allen späteren Gesellschafterversammlungen zu vertreten und für mich das Stimmrecht auszuüben, einmal abgegebene Erklärungen zu ändern oder gänzlich wieder aufzuheben.

Der Bevollmächtigte ist von den Beschränkungen des § 181 BGB befreit.

Gorelik Roudolf Abramowitsch

Unterschrift

Im Namen der Russischen Föderation:

Stadt Moskau. Den siebenten Februar zweitausendundzwei.

Ich, Tscheremnych Gennadij Grigorjewitsch, Notar der Stadt Moskau, bestätige, daß die obenangeführte Vollmacht von vor mir persönlich erschienenen Herrn Gorelik Roudolf Abramowitsch geleistet wurde, wohnhaft per Adresse: Stadt Moskau, Sumskaja-Strasse, Haus Nr. 6, Gebäude 4, Wohnung Nr. 2, der mir als Person, die in vorliegender Vollmacht erwähnt wurde, bekannt ist, die sie in meiner Anwesenheit eigenhändig unterzeichnet und sachgemäß die Ausfertigung dieser Vollmacht bestätigt hat.

Registriert im Register unter Nr. 2-456

Entrichtet gemäß dem Tarif 200 Rub. 00 Kop.

Notar Unterschrift G.G. Tscheremnych

Wappensiegel des Notars der Stadt Moskau Tscheremnych G.G.

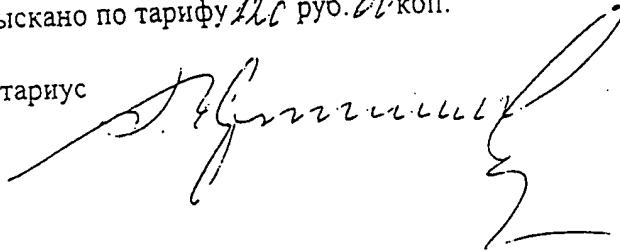
Diese Übersetzung aus dem Russischen ins Deutsche wurde von mir, Daurowa Lena Nikolajewna, ausgeführt, ich bestätige die Identität der Übersetzung. Adr-

Данный перевод с русского языка на немецкий выполнен мной, Даурой Ле-ной Николаевной, идентичность перевода подтверждаю.

Город Москва. Седьмого февраля две тысячи второго года я, ЧЕМНЫХ  
ФЕДИЙ ГРИГОРЬЕВИЧ, нотариус г. Москвы, свидетельствую подлинность  
дела, сделанной известным мне переводчиком, гр. ДАУРОВОЙ ЛЕНОЙ НИ-  
ЛАЕВНОЙ.

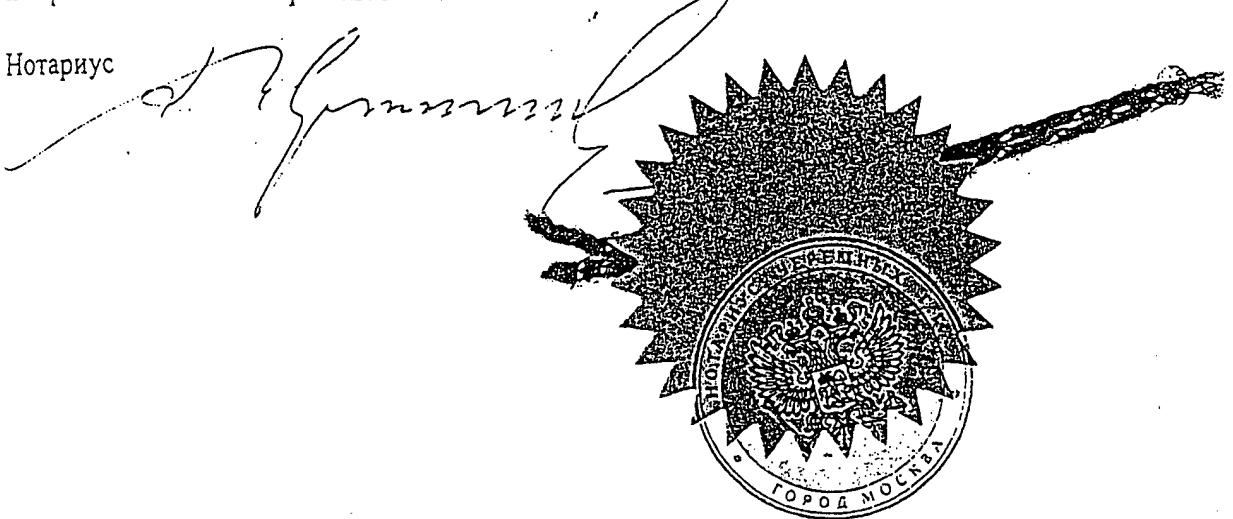
Зарегистрировано в реестре за № 2-463  
Взыскано по тарифу 110 руб. 00 коп.

Нотариус



Всего прошнуровано, пронумеровано  
и скреплено печатью три листа.

Нотариус



APOSTILLE \* АПОСТИЛЬ  
(CONVENTION DE LA HAYE DU 5 OCTOBRE 1961-  
ГААГСКАЯ КОНВЕНЦИЯ ОТ 5 ОКТЯБРЯ 1961г.)

1. РОССИЙСКАЯ ФЕДЕРАЦИЯ *заключила*  
настоящий официальный документ *рукой*  
*Чукин Г.Г.*
2. Подписан *Чукин Г.Г.*  
(фамилия)
3. Выступающим в качестве нотариуса  
(должность)
4. Скреплен печатью нотариуса г. Москвы

УДОСТОВЕРЕНО

5. В городе Москве 6. 11.01.2008-  
*Чукин Г.Г.* *Зам* начальник
7. *Чукин Г.Г.*  
Фамилия, должность лица  
Главного управления Министерства юстиции  
населенного пункта, в котором выдано удостоверение

Российской Федерации № 111111111

С. №

*2394*



Die Übereinstimmung der vorstehenden Abschrift mit der mir vorliegenden Urschrift wird hiermit belegt.

Hamburg, den 28. März 2002

  
Dr. Detlef Thomsen  
Notar



EXHIBIT C

## Vertrag

zur Ergänzung des Vertrags vom 13.11.2002

Zwischen

der  
CHEMPLAST GmbH

vertreten durch den Geschäftsführer Alexander Borovski,  
Valentinskamp 24, 20354 Hamburg

und

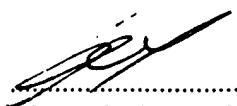
der  
Deutschen Gumtec AG

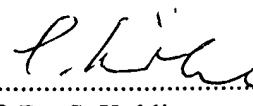
vertreten durch den Vorstandsvorsitzenden Prof. Dr. Siegfried Köhli,  
Ankerstraße 2, 06108 Halle/Saale

Die Parteien schließen zur Patentanmeldung folgende Vereinbarung:

1. Bei der europäischen Patentanmeldung 02 012 210.7 vom 4.Juli 2002 soll neben der CHEMPLAST GmbH die Deutsche Gumtec AG als Mitanmelder auftreten.
2. Bei der vorzunehmenden PCT- Anmeldung mit Priorität der EP- Anmeldung treten beide Parteien gemeinsam als Anmelder auf.
3. Die länderbezogenen Anmeldungen werden wie folgt aufgeteilt:
  - a) die CHEMPLAST GmbH hat das Recht die Anmeldungen in den Ländern auf dem Gebiet der ehemaligen UdSSR in den Grenzen vom 01.01.1990 durchzuführen,
  - b) die Deutsche Gumtec AG hat das Recht die Anmeldungen in allen restlichen Staaten durchzuführen.
4. Die Kosten der EP- Anmeldung und der PCT- Anmeldung für außerhalb der in Punkt 3.a) genannten Gebiete trägt die Deutsche Gumtec AG.  
Die Kosten für die Anmeldung in den in Punkt 3.a) genannten Gebieten trägt die CHEMPLAST GmbH.
5. Die CHEMPLAST GmbH bevollmächtigt die Deutsche Gumtec AG die zur Verfolgung der Patentanmeldungen erforderlichen Erklärungen im Namen der CHEMPLAST GmbH abzugeben, soweit dies gesetzlich zulässig ist.

Halle, den 13.11.2002

  
Alexander Borovski  
Geschäftsführer  
CHEMPLAST GmbH

  
Prof. Dr. S. Köhli  
Vorstandsvorsitzender  
Deutsche Gumtec AG

Übertragungsvereinbarung

zwischen

Chemplast GmbH  
Valentinskamp 24  
D-20354 Hamburg

und

Deutsche Gumtec AG  
Ankerstraße 2  
D-06108 Halle/Saale

Die Deutsche Gumtec AG wird mit allen Rechten und Pflichten  
als weitere Anmelderin für die europäische Patentanmeldung  
Nr. 02 012 210.7 aufgenommen.

Halle, den 19.11.2002

*P. Kühn*  
.....  
Deutsche Gumtec AG

Die Chemplast GmbH stimmt der obigen Regelung zu.

Hamburg, den 19.11.2002

*Heil*  
.....  
Chemplast GmbH

Pr 2/01/04



**Gumtec**

*EXHIBIT D*

Deutsche Gumtec AG Ankerstraße 2 06108 Halle/Saale Germany

Herrn Vladimir Balyberdin  
Chimplast GmbH  
ul. Gebrunova 2a

**107014 Moskau**

**Vorab per Fax: 007 / 095 / 26 90 90 5**

Kö/Ste

22.11.2004

Sehr geehrter Herr Balyberdin,

mehrfache Versuche, Sie telefonisch zu erreichen, sind leider gescheitert.

Die Gebühr für ein Amerika-Patent (über 4.000€) habe ich bereits bezahlt. Ich benötige allerdings die Unterschriften der Erfinder, um in Amerika erfolgreich eine Patentanmeldung zu machen (Termin zur Abgabe der Dokumente: 30.11.2004).

Ich bitte Sie dringend, Ihre Unterschrift zu leisten, weil im anderen Fall die Gebühr für das Patent unwiederbringlich verloren ist und für die Sie bzw. die Erfinder letztlich die Verantwortung übernehmen müssten.

Ich bitte Sie dringend um Ihre Mitwirkung und die Zusendung der unterschriebenen Dokumente mit Originalunterschrift möglichst sofort per Post (vorab per Fax) an uns zurück.

Mit freundlichen Grüßen

Prof. Dr. S. Köhli

Deutsche Gumtec AG

Vorstand und Vertrieb

Ankerstraße 2

06108 Halle/Saale

Germany

Tel +49-(0) 3 45-23 23 551

Fax +49-(0) 3 45-23 23 570

[www.gum-tec.de](http://www.gum-tec.de)

[info@gum-tec.de](mailto:info@gum-tec.de)

Betriebsstätte

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A U F S I C H T S R A T

Vorsitzender

Dr. Ulrich Wrankmore

Mitglieder

Alexander Borovski

Günter Walter

V O R S T A U D

Prof. Dr. Siegfried Köhl

Ringo Skibbe

B A N K V E R B I N D U N G

Stadt- und Saalkreissparkasse Halle

Konto 380 310 214

BLZ 600 537 62

HRB: 13216, Halle/Saale

USt.-Id. Nr.: DE 210671921

Finanzamt Halle-Nord

Steuer Nr. 111 / 100 / 00 369

Deutsche Gumtec AG Ankerstraße 2 06108 Halle/Saale Germany

Россия / Russland  
107014 Москва,  
ООО Химпласт,  
ул. Гебрунова, 2 а,  
Балибердину Владимиру

отправлено по факсу: 007 / 095 / 26 90 90 5 ✓

Галле, 22.11.2004

Уважаемый господин Балибердин,

многочисленные попытки к вам дозвониться не увенчались, к сожалению, успехом.

Пошлина за Американский патент (4.000 €) мною уже заплачена. Мне необходимы подписи изобретателей, для того чтобы осуществить в Америке регистрацию патента (срок подачи документов: 30.11.2004).

Я прошу вас в срочном порядке подписать необходимые документы, ибо в противном случае пошлина за патент будет невозвратно потеряна, и за это вы или изобретатели должны будете перенять ответственность.

Я прошу вас о срочном содействии: пришлите мне, пожалуйста, по почте и по факсу подписанные документы в оригинале, по возможности, безотлагательно.

С уважением

*З. В. Фердин*  
Зигфрид Кёли  
профессор, док. экон. наук

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Vorsitzender  
Dr. Ulrich Wrangmore  
Mitglieder  
Alexander Borovski  
Günter Walter

V O R S T A D  
Prof. Dr. Siegfried Köhli  
Ringo Skibbe

B A N K V E R D I N D U N G  
Stadt- und Saalkreissparkasse Halle  
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BLZ 800 537 62

HRB: 13216, Halle/Saale  
USt.-Id. Nr. DE 210671921  
Finanzamt Halle-Nord  
Steuer Nr. 111 / 100 / 00 369

## DECLARATION FOR PATENT APPLICATION SOLE OR JOINT

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention titled:

### Method And Device For Producing Highly Active Rubber Powder From Rubber Wastes

the specification of which is attached hereto.

I HEREBY STATE THAT I HAVE REVIEWED AND UNDERSTAND THE CONTENTS OF THE ABOVE-IDENTIFIED SPECIFICATION, INCLUDING THE CLAIMS.

I ACKNOWLEDGE THE DUTY TO DISCLOSE ALL INFORMATION KNOWN TO ME TO BE MATERIAL TO PATENTABILITY IN ACCORDANCE WITH TITLE 37, CODE OF FEDERAL REGULATIONS, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

	EUROPE	June 4, 2002	Priority Claimed
EP02012210.7 PCT/EP03/05202 (Number)	PCT (Country)	May 17, 2003 (Day/Month/Year Filed)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

I hereby claim the benefit under 35 U.S.C. 119(3) of any United States provisional application(s) listed below:

	(Country)	(Day/Month/Year Filed)	Priority Claimed
 (Number)			<input type="checkbox"/> Yes <input type="checkbox"/> No

I hereby claim the benefit under Title 35, United States Code, §120 of any United States applications listed below and, IN SO FAR AS THE SUBJECT MATTER OF EACH OF THE CLAIMS OF THIS APPLICATION IS NOT DISCLOSED IN THE PRIOR UNITED STATES APPLICATION IN THE MANNER PROVIDED BY THE FIRST PARAGRAPH OF TITLE 35, UNITED STATES CODE, §112, I ACKNOWLEDGE THE DUTY TO DISCLOSE MATERIAL INFORMATION AS DEFINED IN TITLE 37, CODE OF FEDERAL REGULATIONS, §1.56(a) WHICH OCCURRED BETWEEN THE FILING DATE OF THE PRIOR APPLICATION AND THE NATIONAL OR PCT INTERNATIONAL FILING DATE OF THIS APPLICATION:

(Application Serial Number)	(Filing Date)	(STATUS: Patented, Pending, Abandoned)
 (Application Serial Number)		

**POWER OF ATTORNEY:** As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected herewith (List name and registration number).

(LIST SENIOR PATENT COUNSEL AND ATTORNEY HANDLING CASE WITH PATENT OFFICE REGISTRATION NUMBERS.)

Richard S. Roberts Reg. No. 27,941 Richard S. Roberts, Jr. Reg. No. 46,024  
Marisa A. Roberts Reg. No. 43,048

SEND CORRESPONDENCE TO: Richard S. Roberts

P.O. Box 484  
Princeton, New Jersey 08542-0484

DIRECT TELEPHONE CALLS TO: Richard S. Roberts  
Tel.: (609) 921-3500

## DECLARATION FOR PATENT APPLICATION—SOLE OR JOINT (Continued)

Attorney's Docket No.: RF-33 - Page 2

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 101 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

FULL NAME OF SOLE OR FIRST INVENTOR VLADIMIR BALYBERDIN

INVENTOR'S SIGNATURE \_\_\_\_\_ Date \_\_\_\_\_

RESIDENCE 1 KIRPITSCHNY-QUERSTRASSE, HAUS NR. 22, WOHNUNG NR. 2, MOSCOW, RUSSIACITIZENSHIP RUSSIAPOST OFFICE ADDRESS 1 KIRPITSCHNY-QUERSTRASSE, HAUS NR. 22, WOHNUNG NR. 2,  
MOSCOW, RUSSIAFULL NAME OF SECOND JOINT INVENTOR ROUDOLF GORELIK

INVENTOR'S SIGNATURE \_\_\_\_\_ Date \_\_\_\_\_

RESIDENCE SUMSKAJA-STRASSE, HAUS NR. 6, GEBÄUDE 4, WOHNUNG NR. 2, MOSCOW, RUSSIACITIZENSHIP RUSSIAPOST OFFICE ADDRESS SUMSKAJA-STRASSE, HAUS NR. 6, GEBÄUDE 4, WOHNUNG NR. 2,  
MOSCOW, RUSSIA

FULL NAME OF THIRD JOINT INVENTOR \_\_\_\_\_

INVENTOR'S SIGNATURE \_\_\_\_\_ Date \_\_\_\_\_

RESIDENCE \_\_\_\_\_

CITIZENSHIP \_\_\_\_\_

POST OFFICE ADDRESS \_\_\_\_\_

FULL NAME OF FOURTH JOINT INVENTOR \_\_\_\_\_

INVENTOR'S SIGNATURE \_\_\_\_\_ Date \_\_\_\_\_

RESIDENCE \_\_\_\_\_

CITIZENSHIP \_\_\_\_\_

POST OFFICE ADDRESS \_\_\_\_\_

FULL NAME OF FIFTH JOINT INVENTOR \_\_\_\_\_

INVENTOR'S SIGNATURE \_\_\_\_\_ Date \_\_\_\_\_

RESIDENCE \_\_\_\_\_

CITIZENSHIP \_\_\_\_\_

POST OFFICE ADDRESS \_\_\_\_\_

ASSIGNMENT

WHEREAS the UNDERSIGNED VLADIMIR BALYBERDIN and ROUDOLF GORELIK, citizens of RUSSIA, residing respectively at 1 KIRPITSCHNY-QUERSTRASSE, HAUS NR. 22, WOHNUNG NR. 2, MOSCOW, RUSSIA; and SUMSKAJA-STRASSE, HAUS NR. 6, GEBAUDE 4, WOHNUNG NR. 2, MOSCOW, RUSSIA; have invented certain new and useful improvements (INVENTION) disclosed, shown, and described in an APPLICATION for Letters Patent of the United States entitled:

**METHOD AND DEVICE FOR PRODUCING HIGHLY ACTIVE RUBBER POWDER  
FROM RUBBER WASTES**

Docket No. RF-33, said APPLICATION being executed concurrently herewith; and

WHEREAS, DEUTSCHE GUMTEC AG, a corporation of GERMANY, having an office at ANKERSTRASSE 2, 06108 HALLE, GERMANY (ASSIGNEE) is desirous of acquiring the entire right, title and interest in and to the INVENTION, in this and any foreign country, and in and to any Letters Patent of the United States or any foreign country which may be granted embracing the INVENTION.

NOW, THEREFORE, for and in consideration of One Dollar (\$1.00) and for other good and valuable consideration, receipt of which is hereby acknowledged, the UNDERSIGNED by these presents, sells, assigns, and transfers unto ASSIGNEE, its legal representatives, successors, and assigns, the entire right, title and interest for the United States and all foreign countries, in and to the INVENTION, and in and to the said APPLICATION, and in and to any applications for Letters Patent which may have been or may be filed in any foreign country on said INVENTION, and in and to any and all priority rights generated by the filing of said APPLICATION in the United States or any foreign country, which may be granted covering the INVENTION, including any continuations, continuations-in-part, substitutions, divisions, reissues or renewals thereof, said Letters Patent whether of this country or any foreign country to be held and enjoyed by ASSIGNEE for its interest, for its own use and behoof, and for its legal representatives, successors, and assigns, to the full end of the term for which said Letters Patent may be granted as fully and entirely as the same would have been held by UNDERSIGNED had this assignment and sale not been made.

I covenant and agree that I will, at any time upon the request and at the expense of said ASSIGNEE, execute and deliver any and all papers and do all lawful acts that may be necessary or desirable, in the opinion of said ASSIGNEE, to enable and assist said ASSIGNEE to (a) obtain Letters Patent, both domestic and foreign, on said invention, (b) establish, maintain and secure title in said ASSIGNEE, its successors and assigns, to said invention, application and Letters Patent, including making such title of lawful public record, and (c) defend, establish or otherwise preserve the validity of said Letters Patent against any and all infringers, and perform such other acts as are necessary to give full force and effect to this assignment.

I hereby authorize and request the Commissioner of Patents and Trademarks of the United States to issue all Letters Patent based on said application and all said divisions, continuations, continuations-in-part, reissues, renewals and extensions to said ASSIGNEE, its successors and assigns.

I authorize and empower the said ASSIGNEE, its successors, assigns and legal representatives or nominees, to invoke and claim for any application for patent or other form of protection for said inventions filed by it or them, the benefit of the right of priority provided by the International Convention for the Protection of Industrial Property, as amended, or by any convention which may henceforth be substituted for it, and to invoke and claim such right of priority without further written or oral authorization from me.

I hereby consent that a copy of this assignment shall be deemed a full and legal and formal equivalent of any assignment, consent to file or like document which may be required in any country for any purpose and more particularly in proof of the right of the said ASSIGNEE or nominee to claim the aforesaid benefit of the right of priority provided by the International Convention for the Protection of Industrial Property, as amended, or by any convention which may henceforth be substituted for it.

IN WITNESS WHEREOF this assignment has been executed by UNDERSIGNED on the date opposite their name.

DATE \_\_\_\_\_ VLADIMIR BALYBERDIN

DATE \_\_\_\_\_ ROUDOLF GORELIK

DATE \_\_\_\_\_ WITNESS

The invention relates to the field of the processing of scrap tyres and waste of rubber articles based on different rubber types and is intended for the manufacture of highly active rubber powder for the effective reuse thereof.

The recycling process essentially comprises two stages:

1. Preprocessing tyres and waste of rubber articles in order to obtain maximum textile and metal cord-free rubber pieces of dimensions 10 to 15 mm.
2. Final processing of the pieces obtained in order to obtain a rubber powder of maximum effectivity for reuse purposes.

The invention relates to the second stage.

Numerous processes are known for the processing of scrap tyres and waste of rubber articles either through mechanical impact action on waste cooled to low (cryogenic) temperatures using hammer, stud and other crushers (US patent 3,718,284, B 02 C 11/08, published in 1978 and Russian patent 2 060 833, B 29 B 17/02, priority of 30.11.1993, published on 27.5.1996) or successive impact and cutting action at temperatures of 0 to 60°C in shredders, grooved rollers, etc. (US patent 3 923 256, B 02 C 23/14, published 1975, Russian patent 2 076 045, B 29 B 17/00, priority 29.12.1990, published 27.3.1997, Russian patent 2 057 013, B 29 B 17/00, priority 7.2.1994, published 27.3.1996, Russian patent 2 128 115, B 29 B 17/00, 17/02, priority 4.4.1997, published 27.3.1999, Russian patent 2 076 045, B 29 B 13/10, 17/00, priority 29.12.1990, published 27.3.1997, German patent 37 17 571, B 02 C 18/24, 13/26, priority 25.5.1987, published 23.6.1988, German patent 44 25 049, B 29 B 17/00, priority 15.7.1994, published 18.1.1996, EP 937742, priority 20.2.1998, US 27312 published 25.8.1999, EP 972792, priority 15.7.1998, US 115975, published 19.1.2000).

These processes do not make it possible to produce rubber powders with a high specific, geometrical surface area, which is a criterion of the activity of the powder, in spite of the possibility of the production of very finely ground powders. The maximum specific, geometrical surface of the powder with a particle size of 20  $\mu\text{m}$  does not exceed  $0.12 \text{ m}^2/\text{g}$ .

Numerous apparatuses are known for the production of powders with a relatively high physical and chemical activity from vulcanized rubber waste. In particular, Russian patent 2 038 214, B 29 B 17/00, priority 29.8.1991, published 27.6.1995, Bull. No. 18, German patent 4128630 disclose an apparatus, which has two-worm shafts with three cam zones for crushing, separation and cooling. According to the cited document the crushing of the material results from its successive passage through these zones, which is unjustified from the energy consumption purposes, because more than half of

the material is subject three times to heating and cooling, because each of the three cam crushing zones delivers no more than 25% powder with a necessary fraction composition (particle size no more than 0.8 mm).

It is also impossible to achieve in said apparatus optimum crushing or size reduction parameters (temperature, pressure, time), where the specific geometrical surface of the powder would exceed a value of  $0.4 \text{ m}^2/\text{g}$ , because the crushing of the material takes place on the contacting cam surfaces having no cooling. In addition, the cam zones are extremely sensitive to the presence in rubber waste of foreign bodies (sand, stones, metal cord) and the latter penetrate the gaps between the cams leading to the fracture thereof.

An apparatus is known (Russian patent 2 143 324, B 02 C 19/22, priority 5.2.1998, published 27.12.1999, Bull. No. 36), where the crushing of polymer materials, including elastomers, takes place on two contacting, conical working elements in the form of polygonal disk cams.

The main disadvantage of this apparatus is that coolants are completely lacking and without them the production of powders with an increased surface area is problematical.

One-worm apparatuses with cylindrical casings are known within which in coaxially succeeding and aligned manner are mounted in rotary form a compacting worm and a working member (Russian patent 2 167 056, B 29 B 17/00, 13/10, B 02 C 18/44, 19/22/B 29 K 101.00, priority 23.2.2000, published 20.5.2001, Bull. No. 14 and Russian patent 2 167 057, B 29 B 17/00, 13/10, B 02 C 18/44, 19/22/B 29 K 101.00, priority 23.2.2000, published 20.5.2001, Bull. No. 14).

The processing of the material in these apparatuses does not take place in an elongated annular clearance between the casing and the working member, but instead in annular chambers. In these apparatuses elements such as the casing, worm and working member in each case have independent coolants. Simultaneously the use of the working member in the form of successively positioned, small, annular chambers with a decreasing depth or the construction on the casing or working member, downstream of the worm, of a chamber does not make it possible to achieve the necessary temperatures and pressures in the annular clearance enabling the production of active rubber powders to take place.

Technically the closest to the process proposed is an extrusion processing process, which is performed by the action of shearing deformations, which are sufficient to destroy a large number of rubber pieces and give powders with a particle size up to 0.1 mm (Russian patent 2 057 013, B 29 B 17/00, priority 7.2.1994, published 27.3.1996, Russian patent 2 173 634, B 29 B 13/10, 17/00,

7/42, B 02 C 19/20, 19/22/B 29 K 101.00, priority 23.8.2000, published 20.9.2001, Bull. No. 26).

The main disadvantage of this processing process is a low efficiency of the procedures involved (up to 104 kg/h). In addition, it is difficult when processing vulcanized rubber using the described process to take account of technical and technological characteristics of the differently based rubbers, particularly those based on a high plastic deformation component. In the case of rubbers with a high elastic deformation component which for processing require much higher values of the sliding stress and pressure, it is difficult to adjust the pressure and temperature permitting the maximum size reduction of the product. In addition, the rubber powders produced by this process are characterized by a short storage time of 7 to 10 days, after which their activity decreases and cakability greatly increases. It is therefore most appropriate to create in a rubber processing apparatus zones which ensure the obtaining of higher pressure and temperature values for the material to be processed and the provision of chemical modifiers in order to maintain the powder activity.

Closest to the apparatus according to the invention is an apparatus for producing a powder from polymer material (Russian patent 2 173 635, B 29 B 13/00, 17/00, B 02 C 18/44, 19/22/B 29 K 101.00, priority 23.8.2000, published 20.9.2001), which has a cylindrical casing provided with a charging connection and a discharging connection and within which are formed compacting and size reducing zones, which are provided with a compacting worm with a depth of the grooves between the combs decreasing in the direction of the size reduction zone and a working member in the form of a rotary body on whose working outer surface are formed slots. The two elements are mounted in a coaxially rotatable manner relative to the inner face of the casing, accompanied by the formation therewith of an annular clearance. The casing, compacting worm and working member are provided with coolants. Although it is possible with the described apparatus to produce powder having an adequately large specific surface (up to 0.5 m<sup>2</sup>/g), the capacity or output of the apparatus is not particularly high (max. 104 kg/h). In addition, this apparatus does not make it possible to crush all rubber types, e.g. rubbers having high deformation plastic component values (based on polychloroprenes, cis-isoprene rubbers with a high plasticizer content, chlorobutyl and bromobutyl rubbers, because the apparatus lacks a gas saturation zone and a second crushing zone.

The technical result of the invention is a universal, high efficiency, energy-saving process making it possible to produce highly active rubber powders from scrap tyres and vulcanized waste of rubber articles with a specific, geometrical surface up to 5 m<sup>2</sup>/g, as well as an apparatus for performing this process.

The technical result is achieved in that in the process for the production of a highly active rubber powder with a specific, geometrical surface of 0.4 to 5.0 m<sup>2</sup>/g from scrap tyres and vulcanized waste of rubber articles based on different rubber types, preferably isoprene, butadiene, butadiene styrene, butadiene nitrile rubbers, including hydrogenated, carboxylated, ethylene, propylene, fluorine, fluorosilicone, butadiene vinyl pyridine, silicone, epichlorohydrin, polychloroprene, chlorosulphonated, polyisobutylene acrylic rubbers and mixtures thereof crushing takes place in an extruder-type apparatus under thermomechanical action. According to the invention, the crushing of vulcanized rubbers takes place in two stages:

- Under the conditions of a volume stress of 15 to 150 MPa increasing at a rate of 5 to 90 MPa/s with an amplitude of ±5 to 20 MPa and pulsating at a frequency of 5 to 500 Hz, as well as one with a temperature rising at a rate of 50 to 150°C/s in a range of 90 to 380°C accompanied by the simultaneous gas saturation of rubber with degradation products of plasticizers and other constituents belonging to the rubber composition, their comminution initially takes place accompanied by the formation of a porous structure in the volume of the rubber particles.
- Whilst greatly reducing the volume stress at a rate of 50 to 150 MPa/s, the porous structure is destroyed, the specific, geometrical surface of the rubber particles is increased and said rubber particles are cooled.

During the performance of the process for the production of a rubber powder with a specific, geometrical surface of no less than 0.4 m<sup>2</sup>/g from scrap tyres and vulcanized waste of rubber articles, for the destruction thereof a deformation is possible in a range of 105 to 250% of the limit of the elastic component of rubber deformation.

The effectiveness of this process is increased in the presence of heterogeneity modifiers, namely alcohol telomers of general formula H(CF<sub>2</sub>-CF<sub>2</sub>)<sub>n</sub>-CH<sub>2</sub>OH, N-nitrosodiphenylamine, N-cyclohexylthiophthalimide and chlorinated paraffins in a quantity of 0.1 to 1.9%, which makes it possible to increase the specific, geometrical surface by 15 to 40%, the efficiency of the process by 10 to 55% and the powder storage time from 1 to 6 to 9 months, whilst avoiding caking during transportation.

A considerable increase in the efficiency is also brought about by a physicochemical treatment of the working surfaces of the sleeves with fluorine-containing, organic substances, e.g. with alcohol telomers and/or with materials containing tungsten, nickel, chromium, boron, molybdenum, as well as carbides and nitrides of very high melting point metals, which leads to a reduction of the rubber on metal friction coefficient from 0.82-0.87 to

0.36-0.42.

In the performance of the process for producing a highly active powder from rubber waste, in whose formulation constituents degradable at high temperatures are lacking, rubber crushing takes place in the presence of modifiers in a quantity of 0.7 to 5.0% and which combined with the rubber form volatile substances at a temperature of 70 to 120°C. The modifiers used are sulphenamide M, sulphenamide Z, alcohol telomers, stearic, oleic, citric and oxalic acid.

The process of the invention can also be used for the production of mixed thermoelastoplastics, where a joint size reduction of the waste of rubber articles and thermoplastics and/or thermoelastoplastics such as polyethylenes, polypropylenes, polyvinyl chlorides, polyethylene terephthalates, butadiene-styrene-block copolymers, etc. takes place.

The technical result is also achieved by the fact that in an apparatus for the production of active rubber powders from scrap tyres and waste of rubber articles and having a casing with a charging connection and a discharging connection together with coolants, within which is mounted in rotary coaxial manner a drive, accompanied by the formation of an annular clearance and equipped with a cooling element are installed a compacting worm with a variable depth decreasing in the discharging connection direction and an activator, on whose outer surface and on the casing inner surface facing the activator are formed cutting grooves, on the casing inner surface facing the compacting worm longitudinal ribs are provided, according to the invention on a shaft are mounted a multistart compacting worm and an activator rigidly connected thereto and constructed as a rotary body, as well as a discharging worm, which can be constructed as an independent part or in one piece with the compacting worm. The activator is externally provided with multistart, helical notches with a constant depth in the direction of movement of the material to the discharging connection and in the reverse direction, with an equal number of starts and with a pitch which is 1.1 to 2.5 times greater than the pitch of the compacting worm, and the discharging worm is provided with multistart, helical combs in the straight direction with a pitch, which is 1.15 to 3.0 times greater than the pitch of the compacting worm, with an interturn gap between the worms, which increases in the straight direction through the reduction in the number of worms, the combs being constructed in continuous manner or interrupted by multistart, helical notches in the reverse direction with a pitch equal to the pitch of the combs and the ratio of the length of the activator along the axis to the length of the discharging worm being in a range 0.2:1 to 1:0.3 and in the casing inner surface, which is connected to the worms with a pitch of 0.5 to 1.5 of the starting cut pitch of the particular worm, are formed multistart notches in the straight direction and/or crossing notches in the straight and reverse

direction with a semicircular profile and with a radius corresponding to 0.01 to 0.03 diameter of the worm and a depth 5 to 15% smaller than the radius, the number of notches in one direction being in the range 3 to 50 and the ratio of the number of notches in the straight and reverse direction being 0.3:1.0 to 1.0:0.3.

In the apparatus the notches are made in the straight and reverse direction within the casing in the inner surface of a detachable or releasable sleeve comprising one or two parts.

The worms can be formed on the outer surface of one detachable sleeve or both sleeves.

The cooling elements in the apparatus are constructed as single start, helical grooves with an increased surface area of the walls on the detachable sleeves of the casing and the worms on the side free from the starting cuts for the through-flow of the cooling medium.

In the construction of the apparatus, the drive is based on an electric motor with a constant or variable speed and a control range of 1:15.

Such a construction of the apparatus provides conditions for the two-stage crushing of rubber, initially an increase in the volume stress and temperature with the necessary speed and the simultaneous gas saturation of rubber accompanied by the formation of a porous structure in the particle volume and then on greatly reducing the volume stress with the preset speed where the porous structure is destroyed, the specific, geometrical surface of the rubber particles is increased and the particles are cooled.

Thus, according to the invention, the crushing of scrap tyre pieces and rubber article waste with a size of 10 to 15 mm takes place in the above-described apparatus in two stages ensuring a comminution of rubber in accordance with the following diagram. On the rubber pieces acts an increasing, pulsating volume stress with an amplitude of 5 to 20 MPa and a frequency of 5 to 500 Hz in a range of 15 to 150 MPa. The increase rate is 5 to 90 MPa/s, which leads to a rapid heating and crushing of the rubber to be processed. Heating takes place at a rate of 50 to 150°C/s to 90-380°C/s, as a function of the rubber type to be processed.

The precision of maintaining the temperature of the object to be crushed is ensured by a regulatable liquid cooling of the apparatus.

Such a diagram of producing in the apparatus the pulsating pressure and heating not only contributes to the crushing of the rubber, but also to its gas saturation with volatile substances, which are formed during the heating

and degradation of the plasticizers and other constituents, which contain volatile substances or which are separated during degradation.

The construction of the porous structure in the particles of the crushed rubber can be clearly gathered from fig. 1.

It is also pointed out that the necessary volume stress values are also determined by the rubber type and are dependent on the rubber deformation elastic component. The elastic component limit during deformation with uniaxial expansion can be obtained mathematically according to the formula:

$$\gamma = \delta / 2 \delta T$$

Where  $\delta$  is the difference of the normal stresses and  $\delta T$  the tangential stress  
- Tager A.A., Physical Chemistry of Polymers, 1968, "Chimiya" publishing house, Moscow, p 261.

In this crushing stage it is necessary to deform the vulcanized rubber in a range of 105 to 250% of the rubber deformation elastic component limit. The deformation quantity of the rubber of 105 to 145% makes it possible to destroy particles of vulcanizates with a high plastic component of deformation and 150 to 250% with a high deformation elastic component.

The next rubber crushing stage in the apparatus comprises a strong decrease in the volume stresses at a rate of 15 to 150 MPa/s, which leads to the tearing of the pores and to the formation of large numbers of microcracks on the surface of the rubber particles, which gives rise to a marked increase in the specific, geometrical surface thereof and correspondingly an increase in the physical and chemical activity (fig. 2) and the cooling of the powder to be discharged to a temperature of 40 to 60°C.

As has been shown by experiments, the use of heterogeneity modifiers leads to a marked increase in the number of microcracks in rubber powder particles, these including alcohol telomers of formula  $H(CF_2-CF_2)_n-CH_2OH$ , where  $n > 4$ , N-nitrosodiphenylamine, N-cyclohexylthiophthalimide and chlorinated paraffin.

The use of these modifiers in a quantity of 0.1 to 1.9% makes it possible:

- to shorten the time for reaching the optimum stress values in the first processing stage by increasing the volume of the rubber pieces to be transported (reduction of the rubber/metal friction coefficient), which makes it possible to increase the apparatus efficiency by 10 to 55%,
- to increase the specific, geometrical surface of the powder by 15 to 40%,

- to increase the maintaining of the high physical and chemical activity of the rubber powder from 7 to 30 days to 6 to 9 months,
- to avoid caking of the active rubber powder during storage and transportation.

All the elements of the movable and stationary parts of the apparatus ensures the performance of the process according to the invention.

The first crushing stage characteristic for sliding crushing takes place between the combs of the compacting worm at the end thereof. The necessary rate of rise of the volume stresses and temperature, as well as the efficiency of rubber crushing in this stage are determined by the speed of the worm, the ratio of the thread lead of the combs of the compacting worm and the notches on the casing surface facing the worm, together with the extension of the worm along the rotation axis.

The pulsation of the volume stress intensifies the compacting, heating and crushing processes. The frequency and amplitude of the pulsation of the volume stress are predetermined by the number of helical notches in the reverse direction on the casing surface facing the worms, the number of starts on the compacting worm and the number of helical notches on the activator surface.

The gas saturation of the rubber particles and the formation of gas-filled micropores therein starts at the end of the compacting worm following on to the activator and ends at the start of the discharging worm, when the pressure on the material starts to decrease sharply. As a result of the starting cut pitch of the notches and their number on the activator surface, as well as by the length thereof, it is possible to regulate the gas saturation process via a more uniform thorough heating of the material and a more complete evaporation of the rubber constituents.

Thus, the activator regulates the crushing process in that it creates the conditions of a more uniform thorough heating of the material up to higher temperatures.

The second crushing stage starts at the beginning of the discharging worm following on to the activator and ends in the vicinity of the discharging connection. During the performance thereof it is important to maintain the material volume stress drop rate and avoid a premature reduction to the pressure in the micropores, which destroy the micropore walls and therefore greatly reduces the specific, geometrical surface of the particles and decreases the temperature thereof. The volume pressure drop rate is determined by the interturn space volume between the combs in the straight

direction of this worm part, their starting cut pitch and the depth of the turns, as well as the starting cut pitch and number of starts of the helical notches in the straight direction on the casing surface facing the worm.

The presence of multistart, helical notches in the reverse direction with the same pitch as the combs in the straight direction, but with a smaller number of notches (or starts) on the discharging worm influences the temperature of the powder passing out of the discharge opening of the apparatus.

The comparison of the inventive technical solution with the closest prior art makes it possible to assert that the novelty criterion is fulfilled and the lack in the known technical solutions of the characterizing features of the inventive process and apparatus for the production of a highly active rubber powder makes it clear that the solution according to the invention has the necessary inventive merit.

Fig. 1 is a photograph of the rubber particles obtained by scanning electron microscope JSV-840 (JOEL) at the time of the formation of the porous structure in the initial (first) tyre rubber crushing stage.

Fig. 2 is a photograph of rubber particles obtained with the same scanning electron microscope after the formation of microcracks by tearing of the pores in the case of a strong volume stress drop during tyre rubber crushing.

Fig. 3 is a longitudinal section through the apparatus according to the invention.

The apparatus for the production of a highly active rubber powder from scrap tyres and rubber article waste (fig. 3) has a casing 1 with a charging connection 2 and a discharging connection 3 within which is located an activator 4, in whose lateral face are formed multistart, helical notches in the straight and reverse directions, as well as a discharging connection 5 with multistart, helical combs in the straight direction and which are cut through in the reverse direction by helical notches.

On the charging connection side of the activator is coupled a multistart compacting worm 6 and/or is constructed in one piece therewith. The compacting worm and the activator are fitted to a shaft 8 and constructed on the outer surface of a detachable sleeve and on the inside thereof is provided a cooling element in the form of a single-start, helical channel.

On the inner surface of the casing 1 is mounted a detachable sleeve 9, on whose inner surface facing the compacting worm 6 are formed multistart, helical notches with a semicircular profile in the straight and reverse direction, as well as on the surface facing the activator. On the outside of

the sleeve 9 is formed a cooling element 10 as a single start, helical channel.

Below the charging connection there are three to six rectangular ribs 11 uniformly distributed around the circumference of the casing 1.

Thus, within the casing 1 two size reduction or crushing zones are formed.

The first zone has a charging area, a compacting area and a first crushing area and is formed by the multistart compacting worm 6 and a part of the sleeve 9 surrounding the same and on whose inner surface is provided a conical opening up to the first crushing area with the three to six ribs 11 and also a cylindrical opening with a diameter 1.003 to 1.02 times larger than the diameter of the compacting worm 6 and in the inner surface of the latter and with a pitch which is 0.5 to 1.5 times larger than the starting cut pitch of the compacting worm, are formed 3 to 50 multistart, helical notches with a constant depth and located in the straight and/or reverse direction. The ratio of the lengths along the rotation axis of the compacting area and the first crushing area is in a range 1:05. to 0.5:1. The multistart, helical notches are formed with a semicircular cross-sectional profile with a radius amounting to 0.005 to 0.03 times the compacting worm diameter and with a depth which is 5 to 15% smaller than the radius, the ratio between the number of notches in the straight and reverse direction being in a range 0.3:1.0 to 1.0:0.3.

The second crushing zone has a gas saturation area, a second crushing area and a discharging area. They are formed by an activator in the form of a rotary body and a discharging worm rigidly coupled thereto, as well as a casing surrounding the two components. The activator with the discharging worm is aligned with the compacting worm and is coaxial to the casing inner surface. In the outer surface of the activator and with a pitch which is 1.1 to 2.5 times greater than the starting cut pitch of the compacting worm are formed multistart, helical notches with a constant depth in the straight and reverse direction and with the same pitch and the same number of starts and on the outer surface of the discharging worm are provided multistart, helical combs in the straight direction with a pitch which is 1.15 to 3.0 times greater than the starting cut pitch of the compacting worm, with a volume of the interturn space which increases in the discharging connection direction. The worm combs are either continuous or are interrupted by the helical notches in the reverse direction with a pitch equal to the starting cut pitch of the combs.

The casing inner surface which is cylindrical and surrounds the activator and discharging worm is provided with multistart, helical notches, which are formed with a pitch which is 0.5 to 1.5 times smaller than the starting cut

pitch of the notches on the activator and the combs on the discharging worm in the straight and reverse direction. The ratio of the lengths along the rotation axis of the activator and the discharging worm are in a range 0.2:1 to 1:0.3 and the multistart, helical notches on the casing, activator and discharging worm have a semicircular cross-sectional profile with a radius which is 0.005 to 0.03 times the compacting worm diameter and a depth which is 5 to 15% smaller than the radius, the ratio between the number of notches in the straight and reverse directions being in a range of 0.3:1.0 to 1.0:0.3.

The main principle of the process is implemented in the apparatus shown in fig. 3.

The rubber fragments previously crushed to a size of 15 mm are uniformly supplied to the charging connection 2 by a dosing mechanism not shown in fig. 3. In the apparatus the rubber fragments are taken up by the combs of the compacting worm 6 and guided over the turns thereof with a decreasing depth start to compact. There is an increase in the volume stresses and temperature of the material. When the material reaches the first crushing area the volume stress rise rate reaches a maximum, the pulsation amplitude increases and as a result the rubber rapidly heats through. On reaching the first crushing area the rubber is destroyed under the action of the pulsating volume stress at a specific temperature (characteristic of the particular rubber). Simultaneously the gas saturation of the particles with the degradation products of the rubber and the formation of the porous structure therein commences.

On passing to activator 4 of the gas saturation area there is a thorough heating of the rubber under the action of the volume stress pulsation up to the maximum temperature. The rubber degradation products evaporate to an extreme level and the rubber particle gas saturation reaches a maximum. At the discharging worm of the second crushing area there is a pronounced decrease in the volume stresses acting on the rubber and the gas pressure tears the pores of the fine rubber particles, the specific, geometrical surface of the particles being enlarged many times. Simultaneously there is a reduction in the temperature of the rubber particles and this is continued on contact with the walls of sleeves 6 and 9.

Crushing temperature control is maintained in an optimum manner as a result of the constant pumping of the refrigerant through the coolants of the compacting worm, working member and casing. The presence of these zones in the inventive apparatus contributes to a considerable increase in its efficiency (1.5 to 2.7 times).

Fig. 3 does not show the apparatus drive. The operating parameters of the

processing of tyre rubber with textile cord are given in table 1.

In an example of the implementation of the process in the apparatus the operating parameters thereof are given with a compacting worm diameter of 230 mm. The ratio of the compacting worm length along the rotation axis to the length of the activator and the discharging worm is 0.91 and the ratio of the activator length to the discharging worm length is 0.33.

The compacting worm has two starts and the casing inner surface starting cut following on to the compacting worm is formed by multistart, helical notches, the ratio of the number of notches in the straight and reverse directions being 0.5.

The activator is formed by the starting cut on the outer surface of multistart, helical notches in the straight and reverse direction in equal numbers and with a pitch which is 1.2 times greater than the starting cut pitch of the compacting worm combs.

The discharging worm is formed by the starting cut on the outer surface of multistart, helical combs in the straight direction with a pitch which is 1.2 times greater than the starting cut pitch of the compacting worm combs with a number of combs being equal to 0.5 times the number of notches of the activator in the straight direction.

The helical combs are cut through by the same number of notches with the same pitch, but in the reverse direction.

On the casing inner surface surrounding the activator and the discharging worm are formed multistart, helical notches in the straight and reverse direction with a ratio of 0.5 and a pitch 1.2 times smaller than the starting cut pitch of the activator notches.

Table 1: Operating parameters of processing tyre rubber with textile cord

Test No.	Shaft speed min <sup>-1</sup>	Output kg/h	Apparatus transit time s	Vol. stress in first crushing zone MPa	Temperature in first crushing zone, °C	Rubber temperature at outlet °C
1	32	80	6.0 + 0.8	42	155	35
2	47	145	3.4 + 1.0	68	167	40
3	56	166	2.1 + 1.3	90	170	42
4	67	130	1.3 + 0.9	70	176	48
5	76	105	1.7 + 0.4	60	153	57
6	96	91	1.5 + 0.3	30	150	34
7	60	154	3.3 + 2.7	150	185	71
8*	56	192	2.2 + 1.3	92	171	44

Table 1 (continuation)

Test No.	Volume stress pulsation amplitude ± MPa	Volume stress pulsation frequency Hz	Volume stress increase rate MPa/s	Volume stress decrease rate MPa/s	Specific energy consumption for powder production kWh/t	Specific geometrical surface m <sup>2</sup> /g
1	3-7	16-305	5-7	50-55	800	0.51
2	5-9	23-450	20-25	60-70	540	0.78
3	8-14	28-535	42-46	70-75	430	0.82
4	12-16	34-645	52-55	80-95	515	0.68
5	15-18	38-731	85-90	140-150	760	0.59
6	15-20	48-922	60-70	120-130	800	0.56
7	8-14	30-576	45-50	56-61	486	0.9
8*	8-14	28-535	42-46	70-75	415	1.05

\*N.B. During rubber powder production crushing took place in the presence of the heterogeneity modifier.

As is apparent from the characteristic values given in table 1, the proposed apparatus makes it possible to implement the process for the production of a highly active power over the entire range of the inventive operating parameters with the technical characteristics, which are much higher than those described in the prototype (closest prior art).

As is apparent from table 1, when crushing tyre rubber with textile cord, the apparatus makes it possible to produce powder under optimum operating parameters by modifying the shaft speed and the material supply rate (output).

Thus, the powder to be produced at a shaft speed of  $56 \text{ min}^{-1}$  (test no. 3) and output of  $166 \text{ kg/h}$ , had a specific geometrical surface of  $0.82 \text{ m}^2/\text{g}$  and a specific energy consumption of  $430 \text{ kWh/t}$ .

Moreover, the output was  $192 \text{ kg/h}$  when processing tyre rubber with textile cord in the presence of a heterogeneity modifier in a quantity of 0.2% (test no. 8) for the same shaft speed of  $56 \text{ min}^{-1}$ , whilst the specific, geometrical surface increased to  $1.05 \text{ m}^2/\text{g}$  and the energy consumption decreased to  $415 \text{ kWh/t}$ .

The tests performed confirmed a very extensive industrial usability.

The implementation of the composed, complex technical solution for the production of active rubber powders from scrap tyres and rubber article waste on the basis of different rubber types can be illustrated by the following examples.

#### Example 1

The up to 15 mm pieces of scrap bus types with textile cord underwent crushing in the described apparatus with and without a heterogeneity modifier and with the following operating parameters:

- volume stress rise: 10 to 90 MPa, amplitude: 8 to 14 MPa rate of rise: 42 to 46 MPa/s,
- rubber particle deformation: 150 to 180% of the elastic component limit,
- crushing temperature:  $170^\circ\text{C}$ , temperature rise rate: 80 to  $95^\circ\text{C/s}$ ,
- volume stress decrease with speed of 70 to 75 MPa/s.

The crushing led to rubber powders with the following fraction composition (without modifier):

- 69% of the particles with a size of 0.1 to 0.8 mm and 24% of the particles with a size of 0.81 to 1.6 mm,
- 7% synthetic cord fibres,  
and (with modifier)
- 78% of the particles with a size 0.1 to 0.8 mm and 15% of the particles with a size of 0.81 to 1.3 mm,
- 7% synthetic cord fibres.

The rubber powder also underwent a vibration-air separation with respect to

synthetic cord fragments and was simultaneously fractionated in accordance with the desired particle size.

The fraction of the active rubber powder with a particle size of up to 0.8 mm was used for producing recycling rubber by prior mixing of the powder with the raw rubber mixture, which was intended for the manufacture of bus tyre rubber tread.

Table 1.1 gives technical data of the process for the production of active rubber powder and the characteristic values of its activity (specific surface). The starting material was bus tyres.

Table 1.1

Test no.	Specific power consumption for powder production		Specific geometrical surface of powder	
	without modifier	with modifier	without modifier	with modifier
1	420	405	0.65	0.78
2	430	415	0.82	1.05

Table 1.2 reveals the plastoelastic and physicomechanical characteristics of bus tyre tread rubber, having the active rubber powder produced by various processes.

Table 1.2

List of plastoelastic and physicomechanical characteristics of bus tyre tread rubber having the active rubber powder (ARP) produced during the disposal of tyres (size up to 0.8 mm).

Characteristics	Number of ARP parts by weight/100 parts by weight of rubber phase											
	ARP type						ARP modified					
	ARP unmodified						ARP modified					
	0	5	10	15	20	40	5	10	15	20	40	
Plasticity, agreed unit	0.40	0.41	0.42	0.40	0.46	0.40	0.43	0.45	0.41	0.49	0.44	
Mooney viscosity	60	61	61	60	61	65	55	58	52	53	50	
100°Cx, 4 min												
Vulcanization rate*, 150°Cx 30 min, T = 90 min	10	9.5	9.7	9.7	9.7	8.0	9.0	9.0	10.0	9.0		
Modulus of elasticity 300%, MPa	8.8	8.8	8.8	8.5	7.8	7.5	10.4	10.1	9.9	7.6	9.0	
Tensile strength, MPa	18.9	19.5	17.8	17.6	15.2	12.5	19.3	19.7	19.5	16.6	16.1	
Relative elongation at break, %	510	526	510	510	510	504	482	517	470	517	470	
Relative residual elongation after break, %	16	16	17	17	19	14	16	17	12	12	12	

Characteristics	Number of ARP parts by weight/100 parts by weight of rubber phase											
	ARP type											
	ARP unmodified						ARP modified					
	0	5	10	15	20	40	5	10	15	20	40	
Breaking strength, MPa	8.6	11.3	9.1	8.9	8.7	8.2	9.6	9.1	9.1	9.0	8.4	
Shore A hardness	61	64	67	65	63	65	66	66	65	60	64	
Volume losses on abrading	32	34	24	29	35	55	32	34	32	32	35	

Table 1.2 (continuation)

Characteristics	Number of ARP parts by weight/100 parts by weight of rubber phase				
	ARP type				
	ARP modified + 3% cord				
	5	10	15	20	40
Plasticity, agreed unit	0.48	0.46	0.46	0.42	0.48
Mooney viscosity 100°Cx 4 min	55	54	56	57	61
Vulcanization rate*, 150°Cx 30 min, T = 90 min	8.0	7.0	8.0	8.0	8.0
Modulus of elasticity 300%, MPa	10.9	10.9	10.2	9.9	9.8
Tensile strength, MPa	19.8	18.8	18.9	18.3	17.3
Relative elongation at break, %	500	492	495	510	492
Relative residual elongation after break, %	16	12	12	12	12
Breaking strength, MPa	9.0	9.0	8.4	8.1	9.7
Shore A hardness	66	67	66	66	66
Volume losses on abrading	32	34	34	32	34

\* Monsanto rheometer

Notes:

1. Modified ARP can be very well homogenized during the production of rubber mixtures.
2. Vulcanized, modified ARP-containing rubbers have a planar, smooth surface.

As is apparent from the tables, the process according to the invention makes it possible to produce a high grade, active rubber powder, whose introduction into the tread rubber in values of up to 10 parts by weight leads to no deterioration in the characteristics thereof. When using the heterogeneity modifier during crushing, the quantity of powder to be introduced can be increased by at least up to 15 parts by weight. The use of modifiers also makes it possible to reduce energy consumption during crushing and increase the plant output (by 15 to 55%, as shown by the tests).

Example 2

Waste from rubber articles based on ethylene-propylene rubber with a particle size of up to 15 mm were crushed in the described apparatus with and without a heterogeneity modifier and with the following operating parameters:

- volume stress rise: 10 to 140 MPa, amplitude: 6 to 12 MPa, rate of rise: 40 to 50 MPa/s,
- deformation of rubber particles: 130 to 170% of the elastic component limit,
- crushing temperature: 210 to 240°C, temperature rise rate: 70 to 90°C/s,
- volume stress decrease at rate of 30 to 40 MPa/s.

The rubber powder produced with the modifier consists of 84% particles of size 0.1 to 0.8 mm and 16% of particles of size 0.81 to 1.25 mm and the rubber powder produced without a modifier consists of 79% particles of size 0.1 to 0.8 mm and 11% particles of size 0.81 to 1.45 mm.

The fraction of the active rubber powder with the particle size of up to 0.8 mm was used for producing recycling rubber by premixing the powder with the raw rubber mixture based on ethylene-propylene rubber intended for the production of rubber articles.

Table 2.1 gives the technical data of the process for the production of the active rubber powder and its specific, geometrical surface.

Table 2.1

Starting material	Specific power consumption		Specific, geometrical	
	for powder production kWh/t		powder surface m <sup>2</sup> /g	
	without modifier	with modifier	without modifier	with modifier
Rubber article waste	400	370	0.75	1.05

Table 2.2 gives the physicomechanical characteristics of rubber based on ethylene-propylene rubber containing the rubber powder produced with and without modifier.

Table 2.2

Characteristics	Number of ARP parts by weight/100 parts by weight of rubber phase									
	ARP type					ARP modified				
	ARP unmodified				ARP modified					
Plasticity	0	5	10	20	40	5	10	20	40	
	0.52	0.52	0.50	0.50	0.52	0.54	0.56	0.56	0.54	
Tensile strength MPa	160	165	168	170	155	170	172	176	170	
Relative elongation %	280	286	284	284	280	296	296	290	284	
Impact elasticity %	36	38	38	40	38	38	40	42	42	

The results make it clear that the process according to the invention leads to the obtaining of rubber mixtures based on ethylene-propylene rubbers containing up to 40 parts by weight of the powder with no significant deterioration in the technical and technological characteristics.

Example 3

Rubber article waste based on fluorinated rubber-vinylidene fluoride-trichlorofluoroethylene copolymer - of particle size up to 15 mm underwent crushing in the described apparatus in the presence of a modifier and with the following operating parameters:

- volume stress rise: 10 to 190 MPa, amplitude: 10 to 16 MPa, rate of rise: 40 to 70 MPa/s,
- deformation of rubber particles: 150 to 190% of elastic component limit,
- crushing temperature: 240 to 270°C, temperature rise rate: 90 to 125°C/s,
- volume stress decrease with rate of 60 to 80 MPa/s.

The fraction of the active rubber powder with particle size up to 0.8 mm was used for introduction in a quantity of 5 to 15 parts by weight into the rubber mixture having the following composition:

- SKF 32\*: 100 parts by weight,
- copper-salicylalimine: 5 parts by weight,
- zinc white: 5 parts by weight,
- technical carbon  $\eta$ -701: 30 parts by weight,
- calcium stearate: 5 parts by weight.

Technical characteristics of the test rubber are given in table 3.1.

Table 3.1

Sample	Tensile strength, MPa	Relative elongation, %	Residual elongation, %	Shore A hardness	Relative elongation	Relative compression set	Weight change S2R-1, 23°C, at 200%, 150°C, 24 h
Starting sample	25.5	105	2	80	-50.9	62.8	2.5
Starting sample +5 parts by weight of powder	20.5	95	4	82	-49.4	65.0	1.5
Starting sample +10 parts by weight of powder	23.5	120	5	81	-48.3	66.7	1.6
Starting sample +15 parts by weight of powder	22.0	115	6	78	-41.5	61.1	1.5
Standard value	no less than 20	no less than 90	no more than 10	76-86	-65+25	no more than 70	0-3.5

\*SKF-32: vinylidene fluoride-trichlorofluoroethylene copolymer.

As is apparent from the results submitted, the introduction of the active rubber powder produced from fluorinated rubber-based product into the primary

starting rubber in a quantity of up to 15 parts by weight does not modify the technical characteristics thereof.

Examples 4 to 10

The processes were performed similar to examples 1 and 2. However, in addition, 20 to 40% of the waste of high and low pressure polyethylene and polypropylene were introduced. A mixed material was obtained with a volume stress rise of 15 to 200 MPa, amplitude of 12 to 16 MPa, rate of rise 50 to 60 MPa/s, temperature of 180 to 230°C, temperature rise rate of 100 to 110°C/s and volume stress values giving rise to a deformation of the rubber particles of 115 to 175% of the limit of the elastic deformation component of the starting rubber and a volume stress decrease with a rate of 70 to 90 MPa/s. The modifier must be present. The mixed powders obtained consisted of 82 to 94% of particles with a size up to 0.8 mm. These powders were also treated using an extrusion or calendering process at temperatures of 290 to 240°C in order to obtain plate-like, thermoplastic materials, whose properties are given in table 4.1.

Table 4.1

Physicomechanical characteristics					
Example No.	Material	Tensile strength, MPa	Relative elongation, %	Shore A hardness	Breaking strength, MPa
1	Scrap tyre rubber + 40% high pressure polyethylene waste	26.5	450	68	12.6
2	Scrap tyre rubber + 20% low pressure polyethylene waste	24.8	400	70	11.8
3	Scrap tyre rubber + 20% polypropylene waste	25.4	220	84	13.6
4	Scrap tyre rubber + 40% polypropylene waste	29.2	180	88	14.8
5	Rubber waste based on ethylene-propylene rubber + 40% high pressure polyethylene waste	26.2	380	72	8.9
6	Rubber waste based on ethylene-propylene rubber + 40% low pressure polyethylene waste	26.8	260	84	9.2
7	Rubber waste based on ethylene-propylene rubber + 20% polypropylene waste	28.0	210	82	9.1

Example 11

The waste from rubber articles based on ethylene-propylene rubber with a particle size of 10 to 20 mm underwent crushing in the apparatus with the following operating parameters, the working surfaces of the sleeves being treated with fluoro-organic alcohol telomers and coated with an underlayer of tungsten carbide containing cobalt and with a total thickness of  $0.3 \pm 0.1$  mm:

- volume stress rise: 20 to 120 MPa, amplitude: 8 to 12 MPa, rate of rise:  $50 \pm 5$  MPa/s,
- crushing temperature: 200 to 215°C, temperature rise rate: 60 to 75°C/s,
- volume stress decrease with a rate of 20 to 30 MPa/s.

Starting material	Power consumption cf modifier, kW	Capacity kg/h	Rubber powder quantity with particle size below 0.8 mm
Rubber article waste based on ethylene-propylene rubber	without treatment of the working surfaces of the sleeves 67 to 70	160 to 165	64 to 66
	with treatment of the working surfaces of the sleeves 55 to 60	210 to 225	72 to 75

1. (Currently Amended) Method A method for the manufacture of a highly active rubber powder with a specific geometrical surface of 0.4 to 5 m<sup>2</sup>/g from scrap tyres tires and vulcanized waste of rubber articles based on different rubber types in an extrusion type apparatus under thermomechanical action comprising reducing the size of scrap tires and/or vulcanized waste of rubber articles to rubber particles by subjecting the scrap tires and/or vulcanized waste of rubber articles to, characterized in that the size reduction of vulcanized rubber takes place in two stages: under the conditions of a pulsating volume strain of 15 to 250 MPa increasing at a rate of 5 to 90 MPa/s, with an amplitude +/- 5 to 20 MPa and a frequency of 5 to 600 Hz, as well as with a temperature in the range of 90 to 380°C increasing at a rate of 50 to 150°C/s accompanied by the simultaneous gas saturation of rubber with degradation products of plasticizing agents and other constituents belonging to the rubber composition, their comminution initially takes taking place accompanied by the formation of a porous structure in the volume of the particles, and in the case of a marked volume strain reduction at a rate of 50 to 150 MPa/s, the porous structure is then destroyed, the specific geometrical surface of the rubber particles is increased and the particles are cooled.

2. (Currently Amended) Method The method according to claim 1, characterized in that use is made of wherein the vulcanized waste of rubber articles and scrap tyres tires comprises based on isoprene, butadiene, styrene butadiene, nitrile butadiene rubbers, including hydrogenated carboxylate, ethylene-propylene, fluorine, fluorosilicone, butadiene vinyl pyridine, silicone, epichlorohydrin, polychloroprene, chlorosulphonated, polyisobutylene and acrylate rubbers, as well as mixtures thereof.

3. (Currently Amended) Method The method according to claim 1wherein or 2, characterized in that for the destruction thereof there is a deformation of vulcanized rubber pieces in the range of 105 to 250% of the limit of the elastic component of rubber deformation, accompanied by a simultaneous temperature reduction at a rate of 70 to 150°C/s.

4. (Currently Amended) Method The method according to claim 1 wherein claims 1 to 3, characterized in that for the marked increase of the specific geometrical surface of the rubber

powder by 15 to 40% homogeneity modifiers are introduced, namely comprising alcohol telomers of the formula  $H(CH_2-CF_2)_n-CH_2OH$ , where  $n > 4$ , N-nitrosodiphenylamine, N-cyclohexylthiophthalimide in a quantity of 0.1 to 1.9%, ~~which makes it possible to increase the capacity of the installation by 10 to 55% and the powder storage time up to 6 to 9 months, whilst avoiding caking during transportation.~~

5. (Currently Amended) Method The method according to claim 1 ~~wherein claims 1 to 4, characterized in that~~ for the manufacture of a highly active rubber from rubber waste, whose composition lacks constituents degradable at high temperatures, modifiers – alcohol telomers, sulphenamide M, sulphenamide Z, stearic, oleic, citric and oxalic acid – are introduced in a quantity of 0.2 to 5.0%, combined with rubbers and form volatile substances at a temperature of 70 to 120°C.

6. (Currently Amended) Method The method according to claim 1 ~~wherein claims 1 to 5, characterized in that~~ for the manufacture of mixed thermoelastoplastics there is a joint size reduction of waste of rubber articles and waste of thermoplastics and/or thermoelastoplastics, comprising namely polyethylenes, polypropylenes, polyvinyl chlorides, polyethylene terephthalates, styrene-butadiene block copolymers, etc.

7. (Currently Amended) Apparatus An apparatus for the manufacture of highly active rubber powders from scrap tyers tires and waste of rubber articles, which has comprises a cylindrical casing (1) ~~provided with~~ having a charging connection (2) and a discharging connection (3) and within which are formed a compacting and size reducing zone, which in each case have a compacting worm (6) with a reduction in the depth of the grooves between the combs decreasing in the direction of the size reducing zone and an activator (4) in the form of a rotating body, on whose outer working surface slots are formed, ~~the two elements are being~~ mounted in rotary manner coaxial relative to the casing inner surface accompanied by the formation of an annular clearance with the latter, the casing, the compacting worm (6) and the activator (4) being provided with cooling elements (10), ~~characterized in that there are~~ comprising two size reducing zones, the first size reducing zone being formed by a multistart compacting worm (6) with an

inturn gap volume decreasing in the direction of the discharge connection (3) and the casing surrounding the same, whose inner surface is formed in the compacting area by a conical opening inclined in the direction of the discharge connection (3) and 3 to 6 ribs with a rectangular cross-section engaging in the interior, where in the first size reducing area zone the casing inner surface is formed by a cylindrical opening having a diameter which is 1.003 to 1.02 times larger than the diameter of the compacting worm (6) and into the casing inner surface are incorporated with a starting cut pitch 0.5 to 1.5 times the starting cut pitch of the compacting worm (6) helical notches in multistart form with 3 to 50 starts and a constant depth in the straight and/or reverse direction and where the a ratio of the extensions of the compacting area and the first size reducing area along the rotation axis of the worm is in the range 1:0.5 or to 0.5:1, ~~in addition~~ said compacting and size reducing zones are formed on replaceable, detachable sleeves (9), which are mountable on the a shaft or on the casing (1) and have on one side of the sleeve (9) said working surfaces and on the other side the helical grooves with an increased surface of the walls for pumping a cooling element (10), the second size reducing zone being formed by an activator (4) in the form of a rotating body and a discharge worm (5) rigidly connected thereto and fitted in aligned manner with the compacting worm (6), as well as a cylindrical casing surrounding the two means, whilst while in the outer surface of the activator (4) are incorporated with a pitch which is 1.1 to 2.5 times greater than the starting cut pitch of the compacting worm (6) multistart, helical notches with a constant depth in the straight and reverse directions with the same pitch and the same number of starts, on the outer surface of the discharge worm (5) are formed multistart, helical combs in the a straight direction with a pitch 1.15 to 3.0 times greater than the starting cut pitch of the compacting worm (6) with an inturn gap increasing in the direction of the discharge connection (3), the combs of the worm being constructed continuously or are interrupted by helical notches in the reverse direction with a pitch equal to the starting cut pitch of the combs, that the cylindrical casing inner surface surrounding the activator (4) and the discharge worm (5) is provided with multistart, helical notches constructed with a pitch of 0.5 to 1.5 times smaller than the starting cut pitch of the notches on the activator (4) and the combs of the discharge worm (5) in the straight and reverse directions, the ratio of the extensions of the activator (4) and the discharge worm (5) along the rotation axis being in the range of 0.2:1 to 1:0.3 said working surfaces of the activator (4), the discharge worm (5) and the casing on the

replaceable sleeves (9) on one side and on the other side are cut helical channels with a larger surface area of the walls for pumping the cooling medium, the multistart, helical notches being constructed with a semicircular profile with a radius which is 0.005 to 0.03 times the worm diameter and a depth which is 5 to 15% smaller than the radius, and the ratio of the number of notches in the straight and reverse directions being in the range of 0.3:1.0 to 1.0:0.3.

8. (Currently Amended) Apparatus The apparatus according to claim 7, wherein characterized in that the detachable sleeves (9) of the casing (1) and the shaft are constructed in one or more parts.

9. (Currently Amended) Apparatus The apparatus according to claim 7 wherein or 8, characterized in that the casing (1) is constructed in the form of one or more parts.

10. (Currently Amended) Apparatus The apparatus according to claim 7 wherein one of the claims 7 to 9, characterized in that the annular clearance between the activator (4) and the discharge worm (5) and the casing inner surface is 1.4 to 2.5 times and the depth of the multistart notches on the casing (1) and activator (4) are 2.0 to 4.5 times larger than the annular clearance between the compacting worm (6) and the casing inner surface.

11. (Currently Amended) Apparatus The apparatus according to claim 7 wherein one of the claims 7 to 10, characterized in that the ratio of the extensions of the first and second size reducing zones along the rotation axis is in the range of 0.5 to 1.2.

12. (Currently Amended) Apparatus The apparatus according to claim 7 wherein one of the claims 1 to 11, characterized in that the working surfaces of the removable sleeves (9) of the casing (1) and the shaft are have been treated with materials containing tungsten, chromium, nickel, boron, molybdenum, as well as carbides and nitrides of very high melting point metals, in the presence of fluoroorganic substances.

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EXHIBIT E  
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96

Kö/Ste

22.11.2004

Sehr geehrter Herr Dr. Gorelik,

mehrfache Versuche, Sie telefonisch zu erreichen, sind leider gescheitert.

Die Gebühr für ein Amerika-Patent (über 4.000€) habe ich bereits bezahlt. Ich benötige allerdings die Unterschriften der Erfinder, um in Amerika erfolgreich eine Patentanmeldung zu machen (Termin zur Abgabe der Dokumente: 30.11.2004).

Ich bitte Sie dringend, Ihre Unterschrift zu leisten, weil im anderen Fall die Gebühr für das Patent unwiederbringlich verloren ist und für die Sie bzw. die Erfinder letztlich die Verantwortung übernehmen müssten.

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V 23/11/04 49.

22.11.2004

Уважаемый господин доктор Горелик,

многочисленные попытки к вам дозвониться не увенчались, к сожалению, успехом.

Пошлина за Американский патент (4.000 €) мною уже заплачена. Мне необходимы подписи изобретателей, для того чтобы осуществить в Америке регистрацию патента (срок подачи документов: 30.11.2004).

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С уважением

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**371 FORMALITIES LETTER**



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Date Mailed: 07/13/2005

**NOTIFICATION OF MISSING REQUIREMENTS UNDER 35 U.S.C. 371 IN THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)**

The following items have been submitted by the applicant or the IB to the United States Patent and Trademark Office as a Designated / Elected Office (37 CFR 1.495).

- Indication of Small Entity Status
- Copy of the International Application filed on 12/02/2004
- English Translation of the IA filed on 12/02/2004
- Copy of the International Search Report filed on 12/02/2004
- Preliminary Amendments filed on 12/02/2004
- Information Disclosure Statements filed on 12/02/2004
- Oath or Declaration filed on 12/02/2004
- Request for Immediate Examination filed on 12/02/2004
- U.S. Basic National Fees filed on 12/02/2004
- Priority Documents filed on 12/02/2004

The following items **MUST** be furnished within the period set forth below in order to complete the requirements for acceptance under 35 U.S.C. 371:

- Oath or declaration of the inventors, in compliance with 37 CFR 1.497(a) and (b), identifying the application by the International application number and international filing date. The current oath or declaration does not comply with 37 CFR 1.497(a) and (b) in that it:
  - is not executed in accordance with either 37 CFR 1.66 or 37 CFR 1.68.

**ALL OF THE ITEMS SET FORTH ABOVE MUST BE SUBMITTED WITHIN TWO (2) MONTHS FROM THE DATE OF THIS NOTICE OR BY 32 MONTHS FROM THE PRIORITY DATE FOR THE APPLICATION, WHICHEVER IS LATER. FAILURE TO PROPERLY RESPOND WILL RESULT IN ABANDONMENT.**

The time period set above may be extended by filing a petition and fee for extension of time under the provisions of 37 CFR 1.136(a).

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

*A copy of this notice **MUST** be returned with the response.*

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U.S. APPLICATION NUMBER NO.	INTERNATIONAL APPLICATION NO.	ATTY. DOCKET NO.
10/517,121	PCT/EP03/05202	RF-33

FORM PCT/DO/EO/905 (371 Formalities Notice)

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